ELECTRICAL REVIEW

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VIEWS, NEWS AND INTERVIEWS.

Who would have thought 10 years ago that the following little conversation would occur in 1898?

"Mama, Mama," said four-year-old Dotty, as a tired pair of horses lazily dragged a street car along an unfamiliar avenue, "there's a new kind of twollie car as have to have horses."

The switchboard in the automatic telephone exchange at Amsterdam, N. Y., took a notion to burn up recently. There was no one in the exchange at the time, and when the firemen arrived they had to break in the door, and found one of the switchboards in flames. There is no clue to the origin of the fire, but a crossed electric light wire probably did the mischief. This shows a new danger to poorly constructed automatic exchanges.

The Post Office Department at Washington is beginning to give mail contracts to trolley companies. An order has just been issued by the Postmaster-General establishing a mail service route between Norristown and Collegeville, to be operated by the Schuylkill Traction Company, taking effect on July 25, 1898. Conductors may be seen wearing two uniforms—the trolley's and Uncle Sam's.

The bears of Maine are said to eat the insulators on electric lines, mistaking them for crab apples, of which they are very fond. What a peculiar palate the bears of Maine must have!

The question of signaling at sea has been a topic much discussed by naval officers of late. A number of systems are now in use in our navy. In addition to the "flag hoist system," which is commonly used in daylight when men-of-war are within glass range, fog not interfering, many other methods are necessary, as no single system has yet been devised which is sufficient under all conditions. Some years ago the Morse system was used largely by giving a significance in that code to certain flag movements, but the "Myers" system was mainly used during the Cuban campaign. By the Myers system electric lights in heavy lanterns are run up and down the mast and are operated by a keyboard from the bridge. The lights are in two colors—red meaning one, white meaning two—and the lights are rapidly turned on and off in varying combinations for the formation of letters. Often at night the searchlights are employed for signaling, and by giving the beams certain sky-angles, ships, which would be more than "hull down" in the horizon, would communicate when other systems which necessitate the ships being within actual sighting distance were not possible. It would be practical to communicate by the 200,000,000 candle-power searchlight at Sandy Hook on a clear night with a squadron 100 miles at sea.

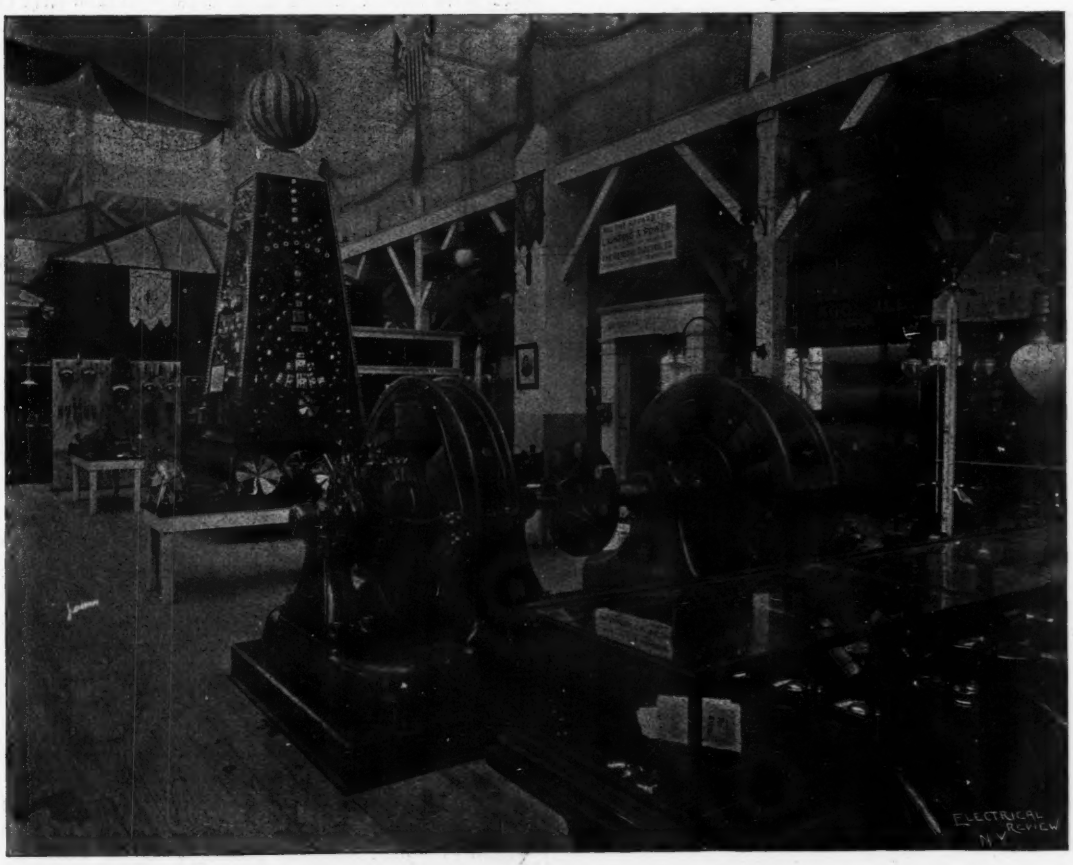

Fig. 1.—Electrical Exhibitions at the Omaha Exposition—View of the Exhibit of the General Electric Company.—(See Page 85.)

THE BOSTON ELECTRIC LIGHT COMPANY.

THE ANNUAL REPORT OF THIS SUCCESSFUL COMPANY PRESENTED IN FULL.

On July 30 the annual report of the directors of the Boston Electric Light Company was presented by President Fred A. Gilbert to the stockholders. The directors of the company are F. A. Gilbert, Chas. L. Lovering, Wm. Butterfield, E. W. Burdett, E. B. Maltby, Dexter N. Richards, Chas. Lowell, Wm. A. Paine and Samuel S. Sias. The officers are F. A. Gilbert, president and general manager; E. B. Maltby, vice-president, and Samuel S. Sias, clerk and treasurer.

The report is as follows, presented by Mr. Gilbert in the following words:

To the Stockholders of the Boston Electric Light Company:

Annexed hereto you will find the financial statement of the company for the fiscal year ending June 30, 1898, showing its receipts and expenses, its assets and liabilities.

From this statement you will observe that both the gross and the net earnings of the company have been larger during the past year than ever before in the history of the corporation. In this connection we deem it advisable to call your attention to the fact that the growth of the business has been sufficient to take care of the increased interest account on the ad-

ditional bonds issued for the increase of plant and the placing under ground of our wire system in nearly the entire business section of the city.

We also desire to call your attention to the results of the reduction of the amount of our dividends from eight per cent to six per cent, two years ago, which have accrued to the benefit of the stock of the company, by enabling the company to use the surplus profits not paid in dividends for the reduction of the floating indebtedness, so that in the past two years the floating debt has been reduced about $210,000.

In the entire business section of the city, twice the capacity of underground conduits was laid as was necessary to take care of the present amount of business, which insures us a sufficient number of ducts to take care of the increased business for a great many years to come, without additional expense in that line, except for the necessary extra cables to be drawn into said ducts.

We have also during the past year been able to obtain dynamos to generate twice as many lights per dynamo, which gives us twice the capacity upon the present circuits already under ground for the arc lighting business.

At a special stockholders' meeting, held since our last annual report, namely, in December, 1897, your board of directors were authorized by the stockholders to purchase real estate in South Boston, which has been done. The Board of Gas and Electric Light Commissioners granted us authority for the issuing of additional stock to enable us to buy this property and build a large generating station on it. This work has been pushed with all the rapidity that was advisable, and we look now to the completion of the new station in October of this year.

This generating plant will be the finest and most complete plant of the kind for this purpose in the world. After careful inspection of all the large plants in the United States and Canada, I visited England, France and Germany, and the plans for the building, with all the machinery for the generation of current, are the results of this investigation. We believe that we shall produce the current at the lowest possible cost under similar conditions.

The station has been constructed large enough to enable us to increase the amount of business 50 per cent, without any further cost for building. The land upon which the station is built comprises 15 acres, about nine of which are solid land, and the company has the right to fill the other six acres to the channel. This property is located within one and one-third miles from the new southern Union station being built by the Terminal company, upon the street which passes one side of the Union station, and is large enough for all the present and prospective needs of the company, with a large surplus for sale in the future. When this station is in thorough running order, that portion of the real estate now being used by the company, which has not been taken by the city for a street and by the railroad company by eminent domain, can be readily sold at a good price.

Respectfully submitted,
F. A. GILBERT, President,
For the Board of Directors.
Boston, July 30.

TREASURER'S REPORT.

The following is a statement of the business of the company for the year ended June 30, 1898:

Received from light rentals and power	$755,538 36	
" " jobbing	50,707 33	
" " income from rents	3,697 58	
Gross income from operations for the year		$809,943 27
Less operating expenses	$469,741 22	
Jobbing expenses	43,667 45	$513,408 67
Leaves profit on business for the year		$296,534 60
Add premium received on stock sold		7,312 37
Total of profits and other income		$303,846 97
Less interest paid on bonds and loans	$ 70,393 17	
Dividends	102,000 00	$172,393 17
Surplus increase for the year, credited to profit and loss		$131,453 80

PROFIT AND LOSS ACCOUNT.

Balance to credit of this account, June 30, 1897	$352,087 75	
Amount credited for the year ending June 30, 1898	131,453 80	
		$483,541 55
Less charged off for depreciation on plant accounts	$ 50,000 00	
Less charged off for depreciation on supplies and materials	2,241 31	$ 52,241 31
Balance to credit to this account, June 30, 1898		$431,300 24

TRIAL BALANCE AND SUMMARY.

DR.		
Plant accounts		$1,882,010 62
Real estate accounts		903,822 32
Underground conduits	$423,637 91	
Underground cables	371,326 14	
		794,964 05
Supplies, materials and tools on hand		71,409 64
Cash		88,633 87
Accounts and notes receivable		152,588 64
		$3,893,429 14
CR.		
Capital stock		$2,093,900 00
First mortgage six per cent bonds		293,000 00
Consolidated first mortgage five per cent bonds		957,000 00
Notes and accounts payable		118,228 90
Balance to credit of profit and loss		431,300 24
		$3,893,429 14

COMPARATIVE STATEMENT OF OPERATIONS FOR THE PAST TWO YEARS.

	1897.	1898.
Income	$759,643 75	$809,943 27
Operating and jobbing expenses	485,498 76	513,408 67
Profits	$274,144 99	$296,534 60
Less interest on bonds and loans	63,242 36	70,393 17
Net, applicable to stock	$210,902 63	$226,141 43

SAMUEL S. SIAS, Treasurer.

The following comparison is made with previous years:

	1898	1897	1896	1895
Gross income	$809,943	$759,643	$660 973	$610,265
Op. expenses	513,409	485,498	420,641	411,449
Profits	296,535	274,145	240,331	198,815
Int. charges	70,393	63,242	50,319	31,845
Net for stock	†233,453	*218,644	190,012	166,969
Dividends	102,000	110,500	136,000	136,000
Surplus	131,453	108,144	54,012	30,969

* Includes $7,742 premium on bonds sold.
† Includes $7,312 premium on stock sold.

Export Orders in Sight for American Productions.

It is likely that the next 12 months will bring a foreign demand for American-made machinery, especially electrical machinery and equipments, unequaled in the annals of our history.

Largely contributory to this is the splendid showing made by every element of the power equipment of our navy and army, bringing an added respect and confidence in all productions of American shops and ingenuity. Already several European governments are negotiating for battle ships to be built and fully equipped in this country. Steam locomotives will be constructed in larger numbers than ever for shipment abroad. Very recently one of the largest street railroads of London has placed an order with American makers for electric generators of large design, and in placing the order beyond the domestic makers, explain "that, as machines of the great units required had never been made in England, it would not be wise to risk an experiment." The South American countries will unquestionably receive new impetus toward mechanical and industrial development, and, coincident with our new territory in the southern seas, this will mean a material increase in our southern export business. Japan and the oriental countries have been rudely awakened to the fact that street railways, electric lights, telegraph and telephone lines must be immediately constructed through vast territory if any sort of independent positions are to be maintained in the community of nations. All this means more to the American factories than to those of any other country.

An Electric Kitchen on a Hospital Ship.

In reply to a letter sent by Miss Helen Gould to the surgeon in charge of the hospital ship "Missouri," asking if there was anything which the association of which she was president could contribute for the comfort of the sick and wounded, it was suggested that four electrical kitchens would be acceptable. The special advantage of these was that cooking could be done in the tropics without suffering the heat from the usual cooking consumption of coal. Estimates are to be asked, and the kitchens' equipments will be immediately installed as requested by Miss Gould's association.

The Mining and Marketing of Mica.

The increasing use of mica in the construction of electrical machinery renders the following information, kindly furnished us by Mr. A. O. Schoonmaker, of New York, the large importer of India mica, of considerable interest.

Mica occurs in small plates in many of the crystalline and metamorphic rocks of India, but the large crystals of commercial value occur associated with felspar and quartz, forming an excessively coarse-grained granite, or pegmatite, and frequently intruded into older granites, or into metamorphic rocks. The felspar, which is often orthoclase, but sometimes oligoclase, occurs in large crystals several inches or even feet in length, whilst the quartz, which was the last formed mineral in the group, occurs in large crystalline masses, but without crystalline outlines. It was molded around the pre-existing mica and felspar crystals, and frequently we find striated surfaces in the shafts, which are in reality the casts in quartz of mica-bundles. That these intrusions have been affected by subsequent earth-movements seems undoubted, since the mica-sheets are so frequently crumpled; but, at the same time, it does not seem likely that these movements could have been of very great magnitude, otherwise the delicate sheets of mica would have been still more distorted; neither the very flexible mica nor the friable felspar could resist any serious earth-movement.

A small and convenient hill having been chosen as the spot for commencing operations upon, a party of the wild hill tribes ascend to the top of the hill and commenced sinking a series of pits the whole way down the profile of the hill, about three feet in diameter each, and a few feet apart. These pits are not continued vertically downwards, but in a zigzag shape, but, nevertheless, not so much out of a vertical line, so that a basket containing the mineral can not be hauled up from the bottom of the pit. The zigzag shape of the shaft is formed by sinking the shaft, first inclining to the left a few feet and then to the right, the head of each cut or notch forming a landing place or step, and thus the necessity of ladders is obviated. The projecting of salient angles of the notches form a perfect flight of steps from the top to the bottom of the pit, which seldom reaches to a greater depth than 40 feet, when, as darkness interferes with the workman's progress, the

pit is forsaken and another commenced upon a few feet further down the hill. A slight framework of faggots, cut from the neighboring trees, is placed over the mouth of each pit, upon which a man sits, awaiting the signal from below to haul up the basket containing the mica and refuse which has been dug from the pit by a rude pick. On arrival at the surface the good and bad materials are separated. The earth and rubbish are shot down the precipitous side of the hill, and the good mica, which in ragged masses about one foot six inches in length, six inches broad and three inches in thickness, after having its ragged edges trimmed off with a reaping hook-looking instrument, is placed by itself in a heap, and the bad or refuse, that is, the softer kind, is also placed aside in a heap by itself.

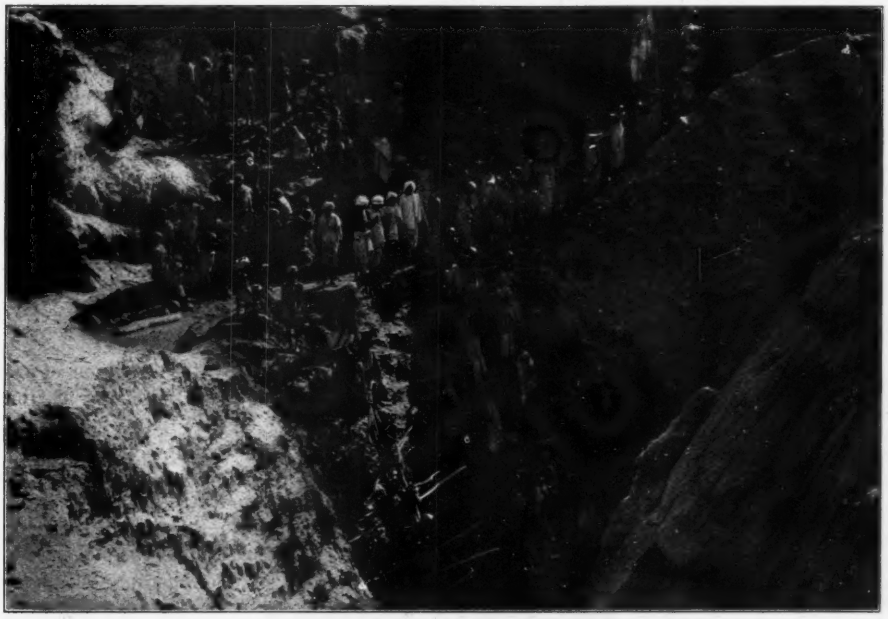

FIG. 1—SCENE AT A MICA MINE IN INDIA, SHOWING LABORERS AT WORK.

The tests as to whether the mica is good for anything, or whether, as the natives say, "it is alive," are its firmness, specific gravity, and the power of reflecting the countenance free of contortions. The latter test shows the perfect parallelism of its individual plates and consequent likelihood to split well. The heavier the mineral and the more perfect the reflection, the more valuable is the mineral considered. All the plates not standing the necessary test are of a soft and flimsy nature, without any of the brilliant sparkle of the better sort, and is called by the natives "dead mica."

The plates of mica are generally brought to the miners' village, and there, after being slightly trimmed with grass-cutting knives (which are not particularly adapted to the purpose, but are probably the only ones the people are able to purchase), are sorted into different heaps, according to quality and size. The quality depends on the mineral being in a perfectly unaltered condition, its transparency and freedom from cloudiness caused by internal foreign matter, the absence of minor cleavages which render it liable to split into ribbons and triangles, and the planeness of its fissile surfaces.

Under the present system of working, the blocks of mica raised from the mine are cleaned of all extraneous matter, such as quartz and felspar, in the stripping room, and when split, either for convenience of size or for the removal of material included along the cleavage planes, the sheets are sent to be "scribed," and afterwards cut with a pair of shears into rectangular shapes along the scribing. Sheets, tin, zinc or iron are used as patterns in scribing.

FIG. 2—NATIVES TRIMMING MICA IN AN INDIAN MINING VILLAGE.

The illustrations reproduced herewith are made from actual photographs of the scenes showing the character and general operation of the mines.

The Proposed Reduction in General Electric Capital.

In a recent Boston interview, General Counsel Fish, of the General Electric Company, gave his views on the proposed capital reduction of his company as follows:

"I think the proposed reduction in capital stock and the charging off of $4,000,000 in patent account is wise and conservative business policy. The patent account, heretofore considered an $8,000,000 asset, has always been an eyesore to me; $4,000,000 is a reasonable valuation. Many of the company's old patents have expired and many new ones taken out. It is difficult to figure patents at their actual value.

"My interpretation of the laws of New York is that there can be no payment of dividends while there is capital impairment, despite the contention of the preferred stockholders. In any reduction of capital both the common and the preferred must share alike.

"It is true that the charter of the company entitles the preferred to receive dividends at the rate of seven per cent on $100 par, but the charter in no way prevents a reduction in capital stock, the preferred holders to share proportionately in this reduction, their dividend being reduced as a natural result.

"As to a compromise, I think the directors have offered all that they consistently can in proposing a 40 per cent instead of a 50 per cent reduction, as originally planned. They are seeking to place the affairs of the company on a conservative business basis. After the proposed capital reduction the impairment, to all intents and purposes, will be corrected, albeit were replacement values to be used—like many other corporations—the assets would be found to be insufficient."

ELECTRIC TRACTION IN ENGLAND.

AN ENGLISHMAN'S LAMENT AT HIS COUNTRY'S BACKWARDNESS.

I have described the backwardness of England in electric traction as a national calamity, says E. F. Vesey, M. P., in the London *Mail*. If by this backwardness we have lost an industry worth $50,000,000 a year, and have deprived our workers of the best available means of getting from their homes to their work, this is surely not too strong a description. The origin of the engineering strike was the complaint of the London men that the time taken in getting to and from their work unduly increased their working day. The pressure of ground rents in central London is due to the inconvenient means of getting to the suburbs. Many a child is growing up with blanched cheek and stunted form in an alley in the center of our cities who might be ruddy and healthy if we had the same facilities for urban transit as the Americans now possess. What, then, is the cause of this calamity? I attribute it to two causes—misdirected socialism and carriage-people's selfishness. In America the corporations have in most states power to authorize any company to lay down tramlines in any street. No act of the legislature is necessary. Concessions have usually been given freely and for long periods. A favorite condition attached to the concession has been the obligation to make lines in the suburbs which cannot pay by themselves. There may have been some corruption in the giving of these concessions, but the result of the policy of free "streets" has certainly been to the public advantage.

There are cities, such as Cleveland and Detroit, which have a mile of tram track for every 1,400 people. St. Louis has as much tram track as London, Glasgow, Liverpool and Manchester put together. The concessionaires, having security of title, as well as the stimulus of competition, have been quick to adopt improvements. In England, on the other hand, no tramway or street railway could, until recently, be made without Parliamentary authority. Most of the tramways were made under provisional orders confirmed by act of Parliament, under the Tramways Act, 1870.

When electric traction became practicable most of the companies were waiting to be bought out, and, naturally, did not care to risk money on improvements which would only increase the value of the good will which they would have to hand over without payment. Nor have the local authorities, when they did purchase, shown anything like the energy which companies have shown in America or abroad. They were naturally afraid to risk the ratepayers' money on large extensions or revolutionary improvements. Glasgow is often spoken of as an instance of successful municipal management. On the expiration of the lease in 1894 the corporation came into possession of tramways running on 33 miles of the principal streets—a shorter length than in most fourth-rate American towns. They have, of course, been able to work these lines at a profit, and to introduce improvements on the service given by the moribund company during its dying years. Lines in principal streets, unencumbered by unprofitable but useful extensions, must pay. But though the capital expenditure of $3,000,000 has been raised by loans at a very cheap rate, the balance paid to the "Common Good" has only been $45,000 a year. In fact, after allowing for reserve and depreciation, the profits of the tramways for 1897 work out at less than four per cent.

This would have been of little importance if the corporation had introduced all the improvements which science had made possible. But in 1894, when electric traction was perfectly practicable, and was actually being adopted by a Dublin company, they went to the expense of getting an entirely new horse equipment—cars, horses, stables, etc.—and spent three years in inquiries before they even decided to lay down a couple of miles of "experimental" electric line. They might as well have tried an experimental telephone.

If this is the history of the most progressive corporation in the kingdom, the outlook for municipal socialism is scarcely a bright one.

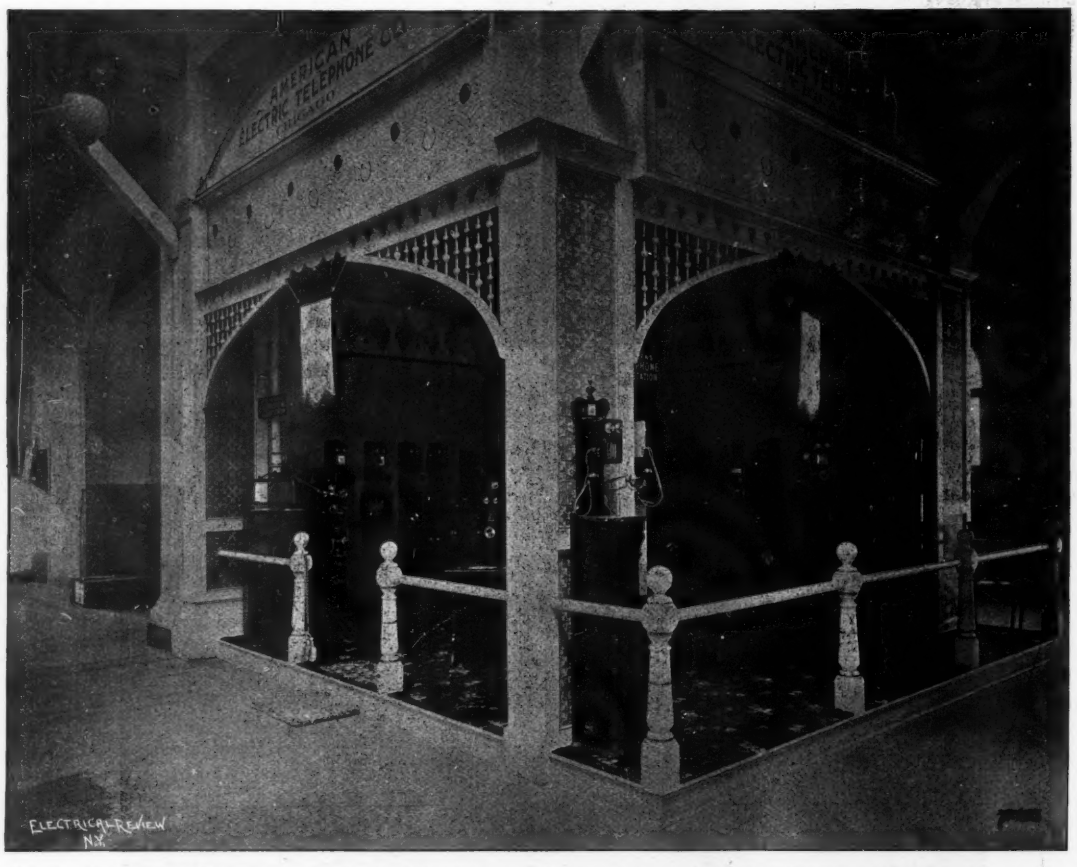

FIG. 2.—ELECTRICAL EXHIBITIONS AT OMAHA—VIEW OF THE EXHIBIT OF THE AMERICAN ELECTRIC TELEPHONE COMPANY.

ELECTRIC LIGHT FLASHES.

The city electric light plant of Portland, Ind., was almost totally destroyed by fire a few days ago.

At the annual meeting of the United Electric Light Company, of Springfield, Mass., William A. Lincoln was re-elected treasurer, and the following directors were chosen: Elisha Morgan, John Olmsted, Charles A. Nichols, Henry J. Beebe, A. B. Wallace, R. W. Day, George B. Holbrook.

By the explosion of machinery at the power-house of the Citizens' Electric Light Company, of Kokomo, Ind., a few days ago, the plant was wrecked and George Dunning, the engineer, was killed. He was badly mangled and died before help could reach him, escaping steam filling the house and preventing his rescue. The city was in darkness.

At the annual meeting of the stockholders of the Nashua, N. H., Light, Heat and Power Company, the following board of directors were elected: F. W. Estabrook, James H. Tolles, Frank E. Anderson, David A. Gregg and George E. Anderson. The board subsequently organized by the election of F. W. Estabrook, president, and James H. Tolles, clerk. W. F. Norton was elected superintendent of the gasworks, and George E. Saddler, superintendent of the electric light department.

At the annual meeting of the Little Androscoggin, Me., Water Power Company, the following officers were elected for the coming year: A. M. Pulsifer and W. W. Bolster, of Auburn, Me; S. L. Milliken, of Augusta, Me.; H. A. Duncan, of Bath, Me.; J. E. Briggs, of Winthrop, and R. W. Dunn, were chosen directors. At the meeting of the board of directors which followed the general meeting, Mr. Bolster was chosen president of the board, Mr. Pulsifer, clerk, and Mr. Duncan, auditor.

Lower Cable Rates to Bermuda.

The Western Union Telegraph Company's central cable office announces that the rate to Bermuda on and after August 1 will be 42 cents per word instead of 81 cents, the prevailing rate.

The Display of Electrical Equipment at the Omaha Exposition.

It has been said in connection with the great Trans-Mississippi and International Exposition at Omaha, now open to the world, that the adaptation of electricity is so general that the era of all other power is past, and the horse is no longer essential even for the plow.

The installations of machinery and modern electric apparatus for the vast system of lighting and power here is, in itself, worthy of study by electricians, but in Electricity and Machinery Hall a splendid exposition of mechanical progress has been made by a large number of representative makers of electrical machinery and equipments.

The illustration herewith gives an idea of the display made by the General Electric Company, of Schenectady, by the Chicago branch. The picture shows one of the six pole, 110-kilowatt railway generators, which may be used as a motor, and is coupled direct to a 12-pole, 150-kilowatt, three-phase alternator, producing 1,000 volts at a speed of 600 revolutions. The company also shows, in operation, one of the 18-kilowatt, three-phase rotary converters. In addition to these machines, the General Electric Company has arranged an exhibition of street railway electric machinery, which gives food for reflection to one who has followed street railway development. In the line of smaller machinery they show a four-pole, 20-kilowatt, 125-volt belted generator and a two-and-one-half-kilowatt dynamo. This company has also a complete storage battery in operation In addition to those described, this exhibition includes almost every character of electrical apparatus, such as a working X-ray booth, arc and incandescent lamps, railway controllers, cutouts, rheostats. The idea of those preparing the exhibit being to show the range of uses for which electricity is applied, and the splendid character of equipment made by the General Electric Company for all these purposes.

The showing made by the telephone manufacturers is particularly elaborate. The picture herewith, made from a photograph, shows the switchboards and the many forms of instruments made by the Western Telephone Construction Company. This exhibition, in charge of Mr. Samuel Platt, of the home office, was described recently in detail in these columns. The illustration of the artistic display made by the American Electric Telephone Company, of Chicago, is a feature of the building. This apparatus forms a collection of instruments which cover every feature of telephony. This, too, was fully described in a recent issue of the ELECTRICAL REVIEW.

In addition to the manufacturers here spoken of, interesting exhibitions have been made by the Weston Electrical Instrument Company, of Newark, N. J., and a number of other firms whose names are familiar in the electrical field.

Stockholders of the Bell Telephone Company, of Philadelphia, will meet on September 20 to vote for or against a resolution passed by the directors for an increase of the capital stock from $2,000,000 to $4,000,000.

The Bell telephone instrument statement for the month ended July 20 shows:

	1898.	1897.	1896.	1895.
Gross output.	21,551	15,859	12,594	13,837
Returned.....	10,011	7,241	10,490	7,513
Net output...	11,540	8,618	2,094	6,324
Since December 20:				
Gross output.	187,884	127,778	126,673	98,896
Returned.....	83,306	51,847	53,667	47,121
Net output..	104,578	75,931	73,011	51,775
Total,	1,023,699	849,780	749,547	654,283

Honors to Lieut. Thos. C. Wood.

Mr. Thos. C. Wood, well known in electrical and engineering circles, one of the owners of the Ball & Wood Engine Company, is a lieutenant on the "Gloucester," which, under Lieutenant-Commander Wainwright, played a very important part in the destruction of the Spanish fleet at Santiago. In his report to Admiral Sampson after the engagement, Commander Wainwright compliments Lieutenant Wood and others as follows, naming Lieutenant Wood first in each instance:

"Lieut. Thomas C. Wood, Lieut. George H. Norman, Jr., and Ensign John T. Edson not only controlled the fire of the guns in their divisions and prevented waste of ammunition, but they also did some excellent shooting themselves. Acting Assistant Surgeon J. F. Bransford took charge of one of the guns and fired it himself occasionally. Acting Assistant Paymaster Alexander Brown had charge of the two Colt guns, firing one himself, and they did excellent work. Assistant Engineer A. M. Proctor carried my orders from the bridge and occasionally fired a gun when I found it was not being served quite satisfactorily. All were cool and active at a time when they could have had but little hope of escaping uninjured.

"Lieutenants Wood and Norman, Ensign Edson and Assistant Engineer Proctor were in charge of the boats engaged in saving life. They all risked their lives repeatedly in boarding and remaining near the two destroyers and the two armored cruisers when their guns were being discharged by the heat and their magazines and boilers were exploding. They also showed great skill in landing and taking off the prisoners through the surf."

LITERARY.

Nearly 70 pictures appear in *Collier's* this week, and most of them are after photographs from scenes of the war with Spain. The double-page picture is of the first Puerto Rico expedition, under General Miles, as photographed from the deck of Captain Sigsbee's present ship, the "St. Paul." On the front page is a drawing by Yohn, after a photograph, of a battery changing direction, at the gallop, in front of Santiago.

The primacy of the United States in the production of iron and steel forms the subject of a practical paper from the pen of John Foord in the August number of the *North American Review*.

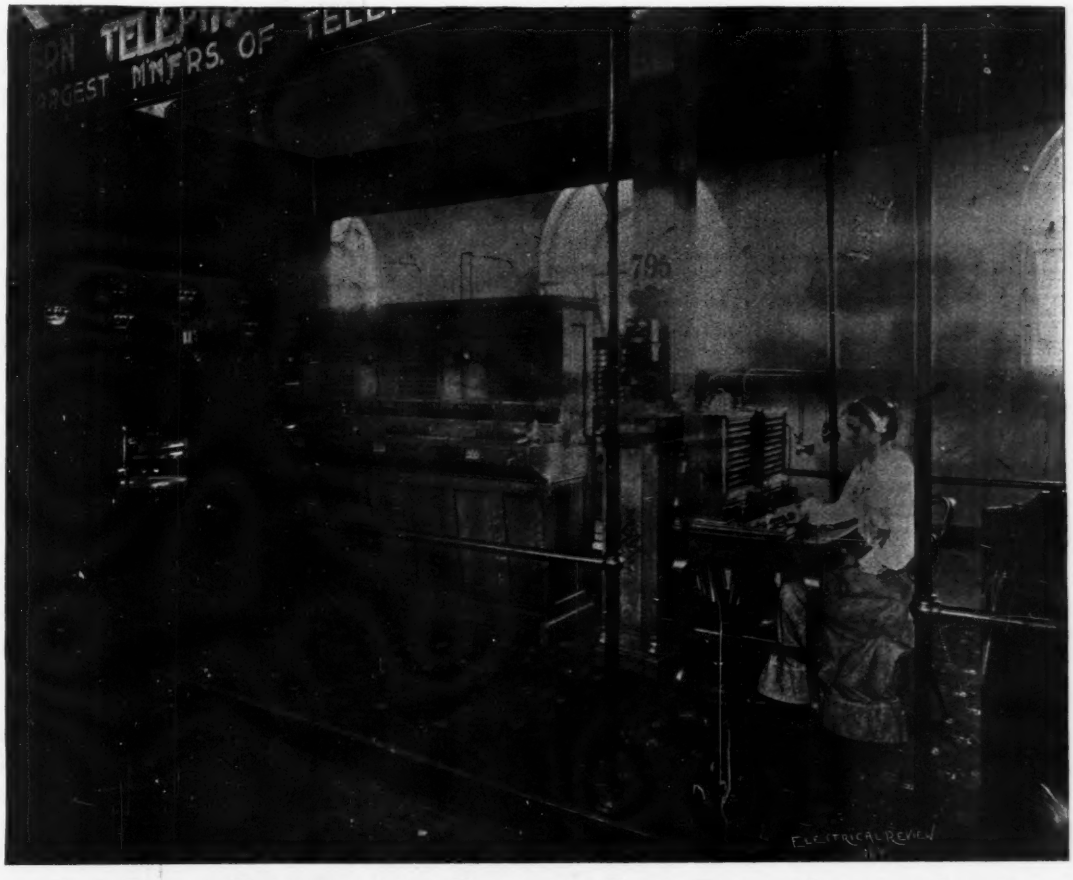

FIG. 3.—ELECTRICAL EXHIBITIONS AT OMAHA—EXHIBIT OF THE WESTERN TELEPHONE CONSTRUCTION COMPANY.

Electrical Review

[OLDEST ELECTRICAL WEEKLY IN THE UNITED STATES.]
TIMES BUILDING, 41 PARK ROW,
P. O. BOX 2330. NEW YORK.

NEW YORK, AUGUST 10, 1898.

CHARLES W. PRICE, - - - - - - - EDITOR.
STEPHEN L. COLES, - - ASSOCIATE EDITOR.
STEPHEN H. GODDARD, ADVERTISING MANAGER.

REGISTERED CABLE ADDRESS:
"ELECTVIEW," - - - NEW YORK.
TELEPHONE CALL, 1546 "CORTLANDT."

NEW YORK OFFICE:
RUSSELL HOWLAND, REPRESENTATIVE,
Times Building, 41 Park Row.

WESTERN OFFICE:
CARL E. KAMMEYER, REPRESENTATIVE,
1627 Monadnock Block, CHICAGO.
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News, Subscriptions and Advertisements.

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It might not be amiss for our electrical friends to prepare for a very busy and business-increasing Fall. All the signs point that way.

The ELECTRICAL REVIEW extends its best wishes to the Superintendents of Fire and Police Telegraph in convention assembled at Elmira this week. This is a young organization that seems to fill a place peculiarly its own, and can not fail to be of benefit to the officials and municipalities interested.

The coming season will bring before the electric light field a number of improvements in enclosed arc lamp construction, some of which are embodied in the lamps known to electricians last year and others of these improvements will be seen in several arc lamps of entirely new design. The evolution within the past two and three years, and the almost universal adoption of the enclosed system for arc lighting, have been unlooked-for developments.

A telephone engineer from abroad who had spent several weeks in a study of American telephone apparatus made the remark that he was greatly impressed by the splendid grade of telephone equipment now being produced by the factories known as the independent interests in this country; especially the exchange and long-distance instruments appealed to him as of great superiority. This favorable criticism is encouraging, in view of the fact that when many independent manufacturers first entered this field several years ago, the output of telephone equipment, in many cases, was of such a character as to seriously interfere with the rapid development of telephony. All this has changed greatly for the better.

As a result of the groundless scare about the safety of the Brooklyn Bridge during the past few days, Washington A. Roebling, under whose supervision the bridge was constructed, has made a most critical examination of the structure, and submitted a careful report to the joint committee of the Municipal Assembly on railroads, bridges and tunnels. The gist of Mr. Roebling's report is that the bridge is as strong to-day as when first used. Moreover, that the strength of the structure had not been impaired in the slightest degree by the recent accident, resulting in several warped girder irons.

In future motormen will be forced to maintain a distance of 102 feet between cars while crossing the main span, but when on the anchorages, which are of solid masonry, cars may be run close together.

WHY AN ELABORATE CABLE SYSTEM WILL BE REMOVED TO ALLOW UNDERGROUND ELECTRIC POWER.

Without a material change in the weight of cars, the Metropolitan Street Railway Company, of New York city, we are informed on good authority, will realize a saving of something more than one per cent per car mile when the underground conduit system supplants the cable power on the Broadway line. This saving, contrary to the general belief, is almost wholly in the increased speed permitted by the electric system over the cable, though the operating expense of the two systems—that is, the coal consumption, labor and manual operation and cost of maintenance of machinery and rolling stock—favors at least to a slight degree the electric power system. The present cost of cable power on the Broadway line is about 12 cents per car mile, of which five cents is for running expenses and power and the remaining seven cents for labor.

This increase in speed will reach 25 to 30 per cent over the present rate of travel, which is six miles an hour.

No thoroughfare in America has proved such a rapid transit problem in view of the constant press of traffic and the fact that aerial construction would not be possible. In deciding to remove an elaborate and recently installed cable system one may readily know that the Metropolitan directors find, for an avenue of this character, that the underground electric system about to be put in is far superior to the best form of cable or any other power yet developed for street-car service.

The death of a user of the telephone by a stroke of lightning has been announced. The subscriber had the telephone receiver to his ear at the moment. This is, we believe, the first instance of the kind that lightning has been able to get into the telephone with such sad results. The lightning arresters have heretofore proved effective, and in this case the conditions must have been unusually favorable. Nevertheless, it is difficult at all times to prepare for a stroke of lightning.

THAT ELECTRIC GUN.

TO THE EDITOR OF ELECTRICAL REVIEW:

I was much interested in reading the article entitled "An Electric Gun," on page 69 of your issue of August 3, in view of the fact that a model gun of this kind, about 12 inches long, was tested in my office within the last few weeks. I don't know whether my friend who brought the gun in is your correspondent with the "rubber imagination" or not, but certainly the small model, which was quite a crude affair, threw its projectile with quite some force for a comparatively short distance. This model rather disturbed one's conventional ideas in regard to a gun, for the barrel was only a roll of stiff paper open at *both* ends.

Perhaps your "prominent savant" has stretched his "rubber imagination" to the utmost, but I am free to confess that I should very much like to see the operation of an electric gun built upon a more practical scale than the model above referred to.

WM. H. MEADOWCROFT.

Harrison, N. J., August 6.

ACETYLENE GAS EXPLODES AND A POET RESPONDS.

TO THE EDITOR OF ELECTRICAL REVIEW:

While stopping at a hotel in the country this Summer a representative of a machine for acetylene gas induced the proprietor of the hotel to allow a machine to be placed on the porch to demonstrate the wonders and desirability of this new illuminant. Result—top of the machine almost blown through the roof of the porch. Further experiments were not indulged in. This incident is responsible for the following:

Oh, thou monster clad in green,
Composed of pipes, valves, fittings and things unseen;
Sufficient power in thee lies
To blow us mortals to the skies.
Skywards we do not care to go,
Preferring, rather, to dwell below.
Get thee hence, and from us quickly pass,
Thou pent-up demon of acetylene gas!

A. H. P.

An ingenious Yankee inventor has perfected a mechanical apparatus to be operated by electricity, which is to take the place of the seaman's arms in the semaphore system of signaling at sea, and it is now being tested on the flagship "New York." This semaphore system is in more general use in the British navy than elsewhere, and consists in conveying messages by means of throwing the arms at various angles. The intention of the Navy Department is said to be to supplement each ship's signaling equipment by this device if it proves efficient.

Electrolytic Marine Salts Company.

The leading stockholders of the Electrolytic Marine Salts Company held an informal meeting in Boston last week, and after a long discussion it was decided that the officials pay all bills of the company and settle up its affairs.

Officials of the company have not as yet given up the idea that there is some merit to Mr. Jernegan's sea water gold process, and that by its use gold can be taken from sea water at a profit, but stockholders are desirous of saving all they can from the wreck and desire the company settled up.

The amount of bills payable is unknown at present, so that it is difficult to estimate the amount of money to go to the credit of stockholders, but it is safe to say that the early estimate of 40 cents will be greatly reduced, if not cut in half. The early estimate hinged on the capture of Messrs. Jernegan and Fisher and a recovery of their booty.

Mr. Melvin O. Adams, one of the leading criminal lawyers of Boston, is reported to have said that he has tried every way to find an extraditable offense against these people but without success, and if Messrs. Jernegan and Fisher are abroad they are beyond the reach of the law.

Dating from March 16, when the first consignment of the alleged sea water bullion was received at the assay office, up to July 19, when the last consignment previous to last week's (which should yield about $4,000) was received, the Electrolytic Marine Salts Company forwarded a total of $22,953 in bullion.

Wall Street and the Electrical Stock Market.

Brooklyn Rapid Transit is again bullish. This is good stock and sure to advance in value under present able management. It is probable that the excursion business of the Summer will show increased net earnings. Brooklyn, electrically considered, is strong. The recent quotations of the stock of the new Kings County Electric Light and Power Company (which now owns the Edison Illuminating and all competing lighting companies) was 105, and the bonds sell at same. The plans of the Kings County will now require reforming, and the new management will at once begin economies and profitable extensions that are likely to bring about further advancement. The Coney Island business of the company, at the West End alone, is nearly 1,500 horse-power in incandescent lighting, at good rates, fed with economy from a station eight miles away.

Manhattan Elevated is quite strong on rumors again of an electrical equipment. This should come soon and we now believe it will.

The highest price for General Electric so far during 1898 was 40½; it closed Saturday at 40⅛. The stock is strong around 40.

Boston Electric Light is selling at 145; Bell Telephone, 279; Erie Telephone, 71.

Osmium Filaments for Incandescent Lamps.

Considerable interest is being shown in the new filament which has been announced by Dr. von Welsbach, the inventor of a system of incandescent gas light.

This he appears to have found in a filament of osmium, one of the rare metals, which, besides being the densest of all metals, is the most refractory, being infusible at any except the highest attainable temperatures. Osmium is found native as an alloy in certain ores of platinum and iridium. It is a hard, bluish-gray metal, with an atomic weight of 191.1, and the enormous specific gravity of 22.477, the heaviest substance known. Its tetroxide has a strong odor of chlorine, from which circumstance its name was originally derived.

But the property which must have suggested osmium as the material of the new electrical filament was its practical infusibility, its known resistance to temperatures in which platinum and iridium volatilize and disappear. It is well known that the intensity of light emitted by an incandescent substance increases rapidly with its absolute temperature. By heating osmium in a vacuum with an electrical current strong enough to volatilize platinum, it is said to attain a luminosity hitherto almost unknown, emitting a white light of agreeable quality and color, but of great intensity.

So far as can be inferred from what has been published, the experiments of Dr. von Welsbach go quite beyond the employment of a naked osmium filament, and include coating the metal with a refractory oxide like thoria.

It has long been known that a platinum wire or filament, through which a sufficiently strong current is passed, attains a white heat and then suddenly melts. If, however, the filament be coated with a highly refractory oxide like thoria, the temperature required to melt it is greatly increased, for the reason that part of the electrical energy is withdrawn from the metal to its oxide coating and is radiated in the forms of light and heat.

Electrical Exhibits for the New York State Fair.

In connection with the annual state fair, to be held at Syracuse during the last three days of August and the first three days of September, the Merchants' Association, of New York, have been asked to take charge of any exhibits to be sent from Greater New York. It is likely that an excellent showing of electrical machinery will be made, as favorable arrangement have been made with the railroads for the transportation of exhibits and to return them. Favorable arrangements have also been made for the transportation of persons to and from the fair who may be sent by exhibitors to take charge of exhibits.

In addition, the committee in charge of the fair has agreed to give space to exhibitors from New York free of all charge, and to look after such exhibits so that they will be properly protected. All details can be ascertained by sending to the Merchants' Association at the New York Life Building, Broadway and Leonard street, New York city.

NEWS NOTES.

The New England Telephone and Telegraph Company is equipping the new addition to the Reynolds House, Boston, with 100 individual telephones. The exchange connections are identical with the system at the Hotel Touraine.

As the result of the fire in the factory of the Lincoln Electric Company, Cleveland, the building was damaged so much that the company has moved into new quarters in the World Building, on Ontario street, and is now in position to execute orders.

The sum of $650,000 has been appropriated by the United States Government for the representation of this country at the Paris Exposition. Mr. Ferdinand Peck, the newly appointed Commissioner, has had a conference with President McKinley, and it is said that the latter will recommend an appropriation of $400,000 additional. The demands for space on the part of exhibitors of the United States is already quite large. Electrical products will, no doubt, be extensively shown.

An Important Decision Adverse to Telephone Interests.

Judge Hagner last Thursday granted James H. Manning a temporary injunction restraining the Chesapeake & Potomac Telephone Company from taking its instrument from his place of business in Washington, D. C. Manning proffered the company a quarterly installment of rent under the $50 rate recently ordered by act of Congress for the District of Columbia.

The company demanded its old rental, and threatened to take out its telephone instrument unless Manning paid. Judge Hagner held that the act of Congress was constitutional, and that pending future legal action the company must furnish its service at the rate prescribed by the new law. The Manning case is but one of a score or more, and was made a test. The telephone company promptly filed notice of appeal, and the case is of such importance that it will undoubtedly be carried to the highest courts. The telephone company claims that the act of Congress only related to government telephones.

Electrical Puns.

"Methinks the day is breaking
Along the northern skies,"
Said Madame de Galvani,
With something of surprise;
"O, no," Galvani answered,
With frog legs on his wires,
"That's only old 'Aurora'
Kindling 'lectric fires."

O, Nordenskjold and Peary
Can never realize
Their dream of sometime seeing
The real "polar eyes,"
Because the troubles thicken
And "counter currents" run,
Till lost is all "potential"
And neither pole is won.

Find currents in the rivers,
Find currants on the bush,
But find electric currents
By running 'gainst a "push."
The railroads have conductors,
Who serve for mammon's hire,
But the best of all "conductors"
Is a great big copper wire.

"I'm pushing ohmward, ohmward,"
The weary current cried,
As he struggled down the wire
With an ode on either side.
I left "anode" this morning,
To "cathode" I am bound,
But I would quit the business
If I could find a "ground."

"O, voltage, press me harder,
My own true E. M. F.,"
The motor sang one evening
Upon a treble cleff;
But Dinah Mo retorted:
"No use to fight with fate,
I can not do your bidding,
The ohmage is too great."

"O, you are soft," said Helix,
To the core which he embraced,
"You kiss the 'keeper' quickly
And then you quit in haste."
"If I am soft, Sir Helix,
What makes you hug me so?
My softness is a treasure,
I rather think you know."

T. Berry Smith.

Fayette, Mo.

THE RELATIONS BETWEEN THE PURCHASER, THE ENGINEER AND THE MANUFACTURER.

READ BEFORE THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS, NIAGARA FALLS, N. Y., JUNE, 1898.

BY WILLIAM H. BRYAN.

(Concluded from page 66.)

I do not desire to be understood, of course, as decrying the use of standard apparatus for that large and increasing percentage of cases for which it is eminently well adapted. The manufacturers deserve great credit for reducing their machines for different classes of service to standards, and the engineering profession is under many obligations to them for doing so, in so thorough and excellent a manner. The reduced cost of standard apparatus—the fact that in using it one follows precedent—that repairs can be more quickly and more cheaply obtained, and that when secured the different parts are actually interchangeable, and will fit, and the further fact that standard machines can usually be secured in less time, being frequently carried in stock—all these are points of tangible advantage which no conscientious engineer can afford to overlook. Standard apparatus, however, is only possible when permanency of type and a reasonably constant demand in large quantities is assured. While it will frequently pay the engineer to modify his plans so as to use standard apparatus, there is a point beyond which he can not go. In such cases he must use special apparatus more closely adapted to his particular needs. All these points must be given the most thorough consideration, and before requiring special work, the engineer must satisfy himself, beyond doubt, that his principal's needs can better be supplied in this manner, even at the increased cost, and in spite of the greater risks which always accompany the use of new and untried apparatus.

The contention that when a manufacturer guarantees results he should be allowed to design and build the machine in his own way, may be granted, in so far as the guarantee can be made to cover every possible valuable feature. When a reasonable number of manufacturers, however, have adopted certain designs and processes of unquestioned superiority, and where these have an important bearing on the life and reliability of the machine, its freedom from annoying interruptions, and which reduce or avoid the necessity for close and continual attention, is it proper to write the specifications so as to limit competition to machines of this advanced type?

Contractors frequently object to specifications which include a deduction for delay in completing the work, but which allow no extra compensation for finishing the work earlier than the date specified. When it is possible for the purchaser to make use of the plant at the earlier date, this criticism is well founded. It is usually the case, however, that the earlier completion in no way benefits the owner, because other equally important contracts may not be finished, or because the date of leases or contracts for service from the plant can not be brought forward. The delay of any one contractor, however, might readily cause the purchaser serious loss.

Another objection made by the manufacturer—and one which is not wholly without justification—is the unnecessarily exacting requirements of some specifications, and the annoyance to which they are subjected by the engineers. It is unfortunately true that our profession has been no more fortunate than others in keeping out of its ranks the incompetent and the unscrupulous. These men have brought disgrace upon the profession, and the objection of the manufacturers to being handicapped by them is well founded. There is, however, no reason now why the purchaser—even though absolutely unfamiliar with work in this field—should make a mistake in selecting an engineer, as a very little investigation will enable him to ascertain the character, ability, and experience of the man under consideration.

The engineer stands between the purchaser and the contractor, and while he may sometimes insist upon his client's rights to an extent which may appear unjust, he nevertheless recognizes the purchaser's obligations as well, and will see that his end of the contract is equally well maintained. In this way unreasonable requirements may be avoided, prompt payments secured, and the acceptance and settlement made at the proper time and along reasonable lines.

Unfortunately there are some manufacturers who think the consulting engineer unnecessary, and that the business could be better transacted directly between the manufacturer and purchaser. This would be true if the purchaser were always competent to judge of the relative merits of the different systems of apparatus. Unfortunately the agent of the manufacturer can not always be trusted implicitly as to recommendations, for two reasons; first, he has not the time to give to the detailed study of the problem which the consulting engineer must give in order to make a proper selection; second, his recommendations are too often biased by a desire to sell standard apparatus, or some specialty of his own, which could be used for the work, although less advantageously than something else.

It is here that the engineer serves his client best, in seeing that the proper apparatus is selected, and that it is bought at reasonable figures. The days when the salesman with the glibbest tongue did the most business, are fortunately passing away, and the small manufacturer has as good a show to do business with the engineer as one of longer standing, providing his apparatus is clearly the best for the work.

The engineer compares machines on as nearly the same basis as possible. So far as the character of the machine will permit, he requires all proposals to be on the same apparatus. When this is impracticable, he specifies capacities, results and general type or construction, leaving the manufacturers to vary the details in accordance with their own designs and practice. Such proposals, however, should be accompanied by ample data, so that the points of agreement and difference may be clearly brought out. With these data before him the engineer is prepared to analyze the bids, and to make a recommendation based upon merit alone, irrespective of the name-plate which may be attached to the machine.

It is not meant by this that no weight whatever is to be given to long experience and established reputation, as there are many details which can not be inquired into, and must be left to the manufacturer's judgment. No conscientious engineer, however, will let the mere reputation of a manufacturer carry undue weight.

Early in my own practice I learned that, while elaborate and detailed specifications embodying all sorts of unusual and peculiar requirements might impress the non-technical reader, and might even gratify the purchaser, they invariably limited competition, and led to excessive prices and annoying delays, and that by purchasing machines as nearly standard as possible, and by modifying the contract to a reasonable extent, to suit the manufacturer in unimportant details, much better terms could be made without increased trouble to either the purchaser or the engineer.

The contract forms submitted by many manufacturing companies are unfair to the purchaser, in that they are wholly one-sided, and are intended to protect the seller in every way possible, while the rights of the purchaser are given but little consideration. Such contract forms are far too common, and for the credit of the profession it is hoped that these may be modified and brought to a more equitable basis.

The ordinary proposals submitted by many companies are equally unfair. Perhaps the most flagrant instance of this is the statement in many bids that they are not effective until approved by an executive officer. Such proposals are not worth the paper they are written on, and should not be considered for a moment by any self-respecting engineer, as they in no way bind the bidders, and their acceptance simply ties up the purchaser. Instances are not lacking where manufacturers have taken advantage of this clause to repudiate bids apparently made in good faith. So common is this practice that it has become necessary to incorporate a clause in the "Notice to Bidders," to the effect that proposals which are not made in good faith will not be considered.

Another unfortunate practice is that which many manufacturers have of asking the return of their proposals and accompanying data as soon as the award is made. These papers are necessary to the purchaser and the engineer, to make a complete record of the transaction, and should be retained by them.

On the other hand, it must be admitted that some engineers' specifications are unfair to the manufacturer. The points on which these complaints are based have been given due consideration, and in my own practice have led to the following rules:

1. When it is desired to permit the bidder some elasticity, and not to require him to adhere rigidly to the specifications, the "Notice to Bidders" contains a clause reserving the right to waive informalities.

2. The engineer is made the arbitrator of all disputes, but appeal is always permitted to a referee or referees. If the contractor thinks he is being treated unfairly he may avail himself of this privilege.

3. A clause is frequently inserted to the effect that where a special make or type of apparatus is mentioned in the specifications, it is not intended to mean the exclusion of all others, but simply as establishing a standard of excellence. The bidder may substitute other apparatus in his proposal, the engineer reserving the right to judge as to whether the article offered is equivalent to that specified.

4. Where the work is such that it is impossible to go into details very fully, and where the apparatus is of such a character that different builders offer different types of construction, which accomplish substantially the same results, or where it is desired to secure the benefit of the most recent improvements, a general clause like the following is sometimes inserted:

"While it is believed that the following specifications properly cover the needs of the purchaser at this time, they are not necessarily final. Bidders are invited to submit alternative propositions embodying any other types of apparatus, or other details of construction, which in their judgment may seem as well or better adapted to the purchaser's needs."

It is to be hoped that this presentation of the matter may result in a better understanding among all parties interested, as to mutual obligations and responsibilities. I believe I may say for the engineers that they will meet the manufacturers fully half way in an effort to reach a more satisfactory basis of co-operation, and to bring about a higher standard of design, workmanship and efficiency, and a more uniform and equitable definition of contract relations.

A certificate of an increase of the capital stock of the Nassau Railway Company, of Brooklyn, N. Y., from $6,000,000 to $15,000,000, has been filed with the Secretary of State, the increase having been approved recently by the State Railroad Commission. The increase is to be expended in pay for road extensions and improvements already made and to be made.

Improved Narrow-Gauge Electric Motors.

The operation of a narrow-gauge road demands a railway motor occupying a more restricted space than the motor built for standard-gauge roads, while giving the same power. The General Electric Company has manufactured narrow-gauge motors for some time past, and many are in actual service, giving the same high degree of satisfaction as the other types of the G E standard-gauge motors. One type of narrow-gauge motor now built is the G E–58 which resembles in outer appearance the standard-gauge motor and has an output of 37 horse-power, based on the standard rating; i. e., a maximum rise of 75 degrees centigrade in the temperature of the windings after a run of one hour at rated load, the temperature of the surrounding air not exceeding 25 degrees centigrade. This motor is built for comparatively heavy service, in which the G E–52 motor would be too light, and is especially desirable in cases of combined city and interurban service with moderately high speeds and heavy traffic. While designed for a minimum gauge of one metre (39¼ inch) the G E–58 may be used with wider-gauge roads.

MAGNET FRAME.

The magnet frame is made of soft steel of high magnetic permeability, cast in two bowl-shaped halves. The frame is divided in a horizontal plane, and the two parts, when bolted together, completely enclose and protect the armature, commutator, brush-holders and field coils. Extension pieces are cast on the top at each end, and extend over and partly enclose the car axle. To the under side of these extension pieces are bolted the axle bearing caps, bored out to support and enclose the axle linings. The armature supports are made by bolting the bearing caps to the under side of the top frame at each end and boring them to receive the linings. The bottom frame is secured to the top frame by bolts, so hinged that when the rear bolts are removed the lower frame will swing down, exposing the armature and field coils for inspection and cleaning. In this position the bottom of field coils may be easily taken out, while, by removing the armature caps and the bottom half of the gear case, the armature and top field coils may be easily removed.

A large opening is provided in the top frame just over the commutator, through which the commutator, brush-holders and brushes can be inspected and worn-out brushes replaced.

BEARINGS.

Appreciating that the renewal of linings is frequently the principal item of maintenance cost of a motor, particularly when designed within the limitations of narrow gauge, much attention has been given to the design of the linings and the bearings. The armature bearing linings are made of machined cast-iron with three sixteenth-inch Babbitt metal, swaged hard and bored to the proper size to fit the shaft. The bearing of the commutator end is two and five-eighths by six and five-sixteenth inches, and on the pinion end three by seven and seven-eighth inches. The supports for the linings are constructed on the outboard plan, which renders the bearings easily accessible and prevents oil or grease from working into the motor frame. The support for the upper half of the armature shaft lining is cast as a part of the upper half of the frame, and is provided with a large cored recess between the inner end of the lining and motor frame. This space is utilized for a thrust collar, so designed that its outer edge acts as an oil guard, and turns in the recess between the motor frame and the bearings. The support for the lower half of the lining is a cap bolted to the upper frame in such a way as not to enclose the lower half of the oil guard, thus allowing free egress for the lubricant after it has passed through the bearing. The axle-bearing linings are similar to the armature-bearing linings, and are eight inches in length and of the required diameter to fit the car axle. The upper supports for these linings are cast with the upper frame; the lower supports are caps bolted to the upper support.

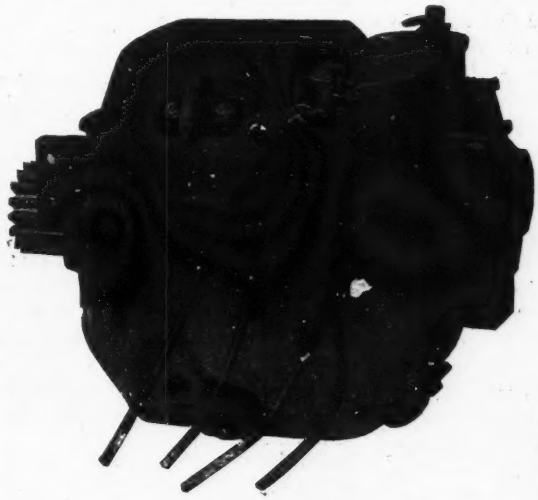

FIG. 1.—G E NARROW-GAUGE ELECTRIC MOTOR, FRONT END.

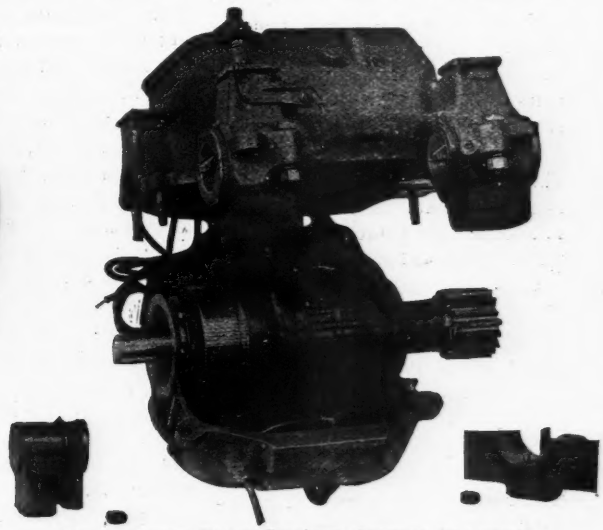

FIG 2.—LOWER FRAME DROPPED, SHOWING ARMATURE READY FOR REMOVAL.

FIELD COILS.

The motor has four field coils, two in each frame, placed at an angle of 45 degrees from the split, and held in place by pressed steel flanges or spool holders clamped by projections on the laminated pole-pieces. The pole-pieces are held in place by through bolts with nuts on the outside of the frame, the coils being placed in position when the pole-pieces are bolted to the frame. The field coils are wound with round wire, insulated with asbestos, and are substantially insulated over all with wrappings of varnished cloth and tape. The insulation between field coils and motor frame is tested by 5,000 volts alternating, sufficient to thoroughly prove the quality of the insulation. The field-coil leads are brought out through the frame in a convenient manner for connecting to the car wiring, and it is not necessary to disconnect any leads inside of the motor frame when dropping the lower half for cleaning.

ARMATURE.

The armature is of the well known iron-clad type, and is 14½ inches in diameter, with a spread of six and one-half inches. The core is built up of well annealed laminations, and is assembled directly on the shaft. There are 33 slots, and each slot contains three coils, collected together and insulated so as to form one triple coil. Hence, there are 33 triple coils connected with 89 commutator bars. A small number of coils is of especial advantage when an armature has to be repaired, and the method of forming the coils into groups of three admits of substantial insulation of high quality.

COMMUTATOR AND BRUSH-HOLDERS.

The commutator is 10 inches in diameter. Its segments are four and three-eighth inches long, with a wearing depth of one inch, and are insulated from the shell by cone clamping insulations of the best quality of pressed mica. The segments are of the highest grade drawn copper, of uniform hardness, and are slotted at the back for the armature leads. The mica between the segments is of a somewhat softer quality than that used in the clamping insulations, to insure an even wear with the copper segments. The completed commutator is tested by 5,000 volts between segments and shell and 500 volts between adjacent segments.

SUSPENSION.

G E–58 motors are adapted to nose, yoke or side-bar suspension. The yoke suspension is especially recommended, as the weight of the motor is carried on springs placed upon the side of the truck frame. Lugs are cast on the upper magnet frame, to which the suspension bar is bolted; the lower half may, therefore, be swung down into the pit without disturbing the upper half, which remains suspended from the axle and yoke. When the motor is mounted on 33-inch wheels, the clearance between the bottom of the motor frame and the top of the rails is four and one-quarter inches; the clearance between the bottom of the gear case and the top of the track is four and one-quarter inches. The motor, without gear or gear case, weighs 1,865 pounds and completed, with both gear and gear case, weighs 2,150 pounds.

Electrical Terms for Students.

TO THE EDITOR OF ELECTRICAL REVIEW:

In my classroom work I find it convenient sometimes to suggest a new term or expression which will assist the pupils to remember things. I will mention a few of them, maybe the world will like them and adopt them.

Under induced currents, I say of currents induced in the wire itself, they are "ipsinduced," ipse in Latin meaning self; but of currents induced in other wires I say "alt-induced," alter in Latin meaning other.

In chemistry we call molecules composed of like atoms, "homatomic;" but molecules composed of unlike atoms we call "heteratomic."

As the unit of momentum we use the word "mome," a word whose singular and plural are both easy to say. Yours truly,

T. BERRY SMITH.

Fayette, Mo.

CANADIAN ELECTRICAL NEWS.

HAMILTON, ONT.—The bill of the Hamilton & Lake Erie Power Company was passed in the Senate at Ottawa.

BURK'S FALLS, ONT.—The Magnetawan Tanning and Electric Company purpose extending their plant and building.

BRANTFORD, ONT.—A company has been formed here for the construction of an electric railway between Waterford and Port Dover.

LANARK, ONT.—It has been stated that the necessary capital is secured to build the proposed electric railway between Lanark and Perth.

OTTAWA, ONT.—It is reported that the Ottawa Electric Railway Company intends extending its lines to Britannia. A bridge will be built across to Aylmer.

VICTORIA, B. C.—The British Columbia Electric Railway Company have asked for an extension for two years of the time for the completion of their line.

GRANBY, QUE. — The ratepayers will vote on a by-law to raise $50,000 to pay off certain liabilities, to install an electric light plant and make permanent roads and sidewalks.

ASHCROFT, B. C.—The Ashcroft Water, Light and Power Company will erect a power-house on the Bonaparte River about three miles from this place, and install an electric light and power plant.

QUEBEC, QUE —It has been decided not to extend the electric railway to Montmorency this year, but everything will be in readiness for the change of the system from steam to electricity next year.

ACTON, ONT. — The council has received a proposition from the Stayner Electric Light Company to light the streets of this town. It is stated that $5,000 would be required for building and plant.

KINGSTON, ONT. — The Electric Construction Company, of London, Ont., are in need of an increased accommodation, and an effort is being made to have the company establish its works in this city.

PARIS, ONT.—A deputation of Toronto gentlemen has approached the council on the subject of the construction of an electric railway between this town and Ayr. It is understood that a charter has been applied for.

VICTORIA, B. C.—It is understood that the Consolidated Electric Light Company are preparing to utilize the water-power at Goldstream for the operating of electric lighting and railway systems. The work will probably cost $100,000.

NELSON, B. C.—S. C. Drummond, representing the British Electric Traction Company, London, England, has applied to the City Council for a charter for an electric street railway. The council has signified its willingness to grant the application on suitable terms.

PARIS, ONT.—A company is seeking a charter under the name of the Grand River Electric Light and Power Company to construct a stone dam across the river at M. Cavan's farm, with the object of supplying light and power. M. Fair, of Brantford, is the company's engineer.

HAMILTON, ONT.—The annual meeting of the shareholders of the Hamilton, Chedoke & Ancaster Electric Railway Company was held last Saturday. It was stated that about $30,000 of stock had been disposed of, and that the construction would be commenced at an early date.

GRAND FALLS, N. B.—A company has been formed, composed of Sir William Van Horne, Senator Proctor, of Vermont; Secretary Alger and others, to develop the water-power at this place and transmit electric power north to River du Soup and south to Woodstock. The development works are expected to cost $20,000.

MONTREAL, QUE —An important contract has recently been made between the Dominion Cotton Company and the Royal Electric Company, whereby the former are to install electricity in their works as the motive power. The contract calls for 1,500 horse-power from the Chambly works, with the option of increasing it to 3,000, the contract to run 20 years.

Montreal, August 1. J. A. C.

The Improved Fire Cable in Australia.

The practical working of the Montauk fire-alarm cables has been so successful that only within a short time has the Montauk Multiphase Cable Company been able to devote attention to foreign interests.

The following extract from the Williamston *Times*, of Melbourne, Australia, is interesting, as Mr. Kirkby, city electrician for Melbourne, expresses the belief that the great Melbourne fire would have been prevented had this cable been installed.

"Mr. Kirkby has introduced the Montauk multiphase fire cable into the Colony, and it was submitted to a highly satisfactory practical test for the first time in Australia yesterday. It is a most ingenious invention and Mr. Kirkby is so satisfied with it that he has taken the responsibility of recommending it to Mr. Stein, superintendent of the metropolitan fire brigade, and will introduce it to the big mercantile houses of the city. The cable can be attached to an ordinary electric bell, to a telephone, and to the fire alarm. The great and peculiar property possessed by this cable is that when it is ignited it will instantly ring a fire alarm on any premises where Mr. Kirkby's automatic fire alarm is connected with it. Mr. Kirkby is convinced that if this cable had been used in Melbourne recently, the great fire at which damage to the amount of nearly 1,000,000 sterling was done would have been avoided."

The X Rays in Military Surgery.

[*From The Lancet, London.*]

Professor Küttner, of Tübingen, who followed the last Greek War in connection with the German Red Cross Society, has made some interesting experiments with the Roentgen rays at the Constantinople Hospital. In his report, just issued, he says that, while the apparatus proved of service when applied with the screen, it was rarely possible to take a satisfactory photograph on account of the difficulty of bringing the patients into the proper position. The former method proved often the only way to ascertain the site of a projectile which had entered the body and had remained there. This was applicable to all parts of the body except the stomach and head. A bullet in the brain, for instance, showed very indistinctly. (Last Spring an arrangement of mirrors was exhibited at a soirée of the Royal Institution, where a photograph of the brain showed in relief, thus enabling the operator not only to see the foreign body, but also to measure correctly its distance from the outer wall of the cranium.) Professor Küttner says it is noteworthy that splinters of bullets and of bone which had penetrated into the soft parts of the body could not be distinguished from each other. Also, he says, it was proved that the opinion that deep-lying masses of pus could be located was erroneous. Injuries to the central nervous system, the spinal cord and the peripheral nerves were solely ascertainable by the aid of the Roentgen rays. It was impossible to do this before. Furthermore, it could be seen whether a bone was totally or only partially severed—a matter of great importance as far as therapeutics are concerned. For shot-wounds in the extremities he recommends that a photograph be taken. His conclusion is that the Roentgen rays are of great importance for medical aid in war, but only for fixed hospitals, such as reserve hospitals and those installed in fortresses, while for moving field hospitals their application is very limited.

Mexican Electric Tramways.

A meeting of the stockholders of the Mexican Electric Tramways, Limited, was held recently at the company's offices in London. Mr. L. Breitmeyer, chairman of the meeting, made the following statement:

I will explain to you in a few words the objects of the company. The company was registered on April 13 of this year, with an ordinary share capital of £500,000 and £400,000 in five per cent debentures. It holds its concessions in the City of Mexico, through the intermediary of, and by control of, the Compania de Ferrocarriles del Distrito Federal de Mexico, a limited liability company registered in Mexico with a capital of $20,000,000, Mexican currency, ordinary shares, and $6,000,000, Mexican currency, six per cent debentures (first mortgage), and $2,166,900 six per cent second mortgage debentures. Of the ordinary share capital the English company owns 95 per cent. The first debentures are all held locally in Mexico, and the second are owned by the English company. In exchange for the second debentures the English company issued five per cent debentures at 90 per cent, and the £400,000 will be about sufficient for the exchange of the second debentures, and to pay for the electrical equipment of the principal main line of 25 miles of the present tramways system. The total length of the tramway is about 150 miles. The concession covering the above tramways system runs for the period of 99 years, commencing from the year 1883. As a horse tramway the traffic shows a remarkable increase, as will appear from the following figures: In 1894 the average monthly receipts were $102,200; in 1895 the average monthly receipts were $117,800; in 1896 the average monthly receipts were $126,590; in 1897 the average monthly receipts were $135,185, and the current year continues the upward tendency, the monthly average up to the end of June last being about $147,000. The profits made at present are more than sufficient to pay interest on both classes of debentures. The existing system carries the total population of Mexico about 50 times a year, and it is reasonably expected that, by the continued improvement of the service and partial electrical equipment, an enormous increase will be shown. In many cities in the United States the passengers carried reach as high a figure as 150 times the entire population in one year. The equipment having been purchased, the work of electrical construction is being proceeded with. The foregoing are the chief points about which, at this early stage of the existence of the company, the shareholders should be advised, and before concluding I wish to draw your attention to our favorable concession, which runs for an unexpired period of 83 years, an unusual feature in tramway concessions. I need hardly mention the great strides which the Republic of Mexico has made in recent years under the present able and liberal administration.

LATE NEWS.

Nearly 400 linemen in St. Louis have struck. They demand $3 for 10 hours' work. The strike includes electric light and telephone employés.

Sixty linemen employed by the city in Chicago have struck. It is over a question of double pay for extra work. City Electrician Ellicott regards the demand as unreasonable.

At noon Friday, August 5, the street railway employés at Syracuse, N. Y., went on a strike. The entire system of the Syracuse Rapid Transit Company is tied up. The strike has apparently come about through the order of the company requiring a deposit of $25 as a guarantee of good behavior and honesty on the part of the employés. The men claim other grievances. There seems to be some local sympathy for the men.

LATER—On Monday of this week the strike was called off and the men went back to work, their terms having been accepted.

An Electrical Factory Working Day and Night.

A contract awarded to the Walker Company, of Cleveland, Ohio, for alternating-current electric generators, was received about 10 days ago. This order consisted of twenty 500-horse-power generators, with other apparatus, for the Union Carbide Company, of Chicago, and was in itself the largest single order for machinery of the alternating type ever placed.

Prof. S. H. Short, vice-president of the Walker Company, has, during a recent trip to Chicago, secured a duplicate of this contract from the same company. The order, as it stands, comprises over 20,000 horse-power in generators, and forms the largest contract for electric machinery of any kind ever awarded.

The shops of the Walker Company are running night and day on existing orders, and the recent large additions to the plant will be taxed to their utmost to put out the immense amount of work already in hand.

The Guggenheim Smelting Company are making extensive additions to their refining plant at Perth Amboy, N. J. The buildings they are putting up will be fireproof throughout, being constructed of steel framework covered with corrugated iron. The contract for furnishing and erecting these buildings has been let to the Berlin Iron Bridge Company, of East Berlin, Ct. The Berlin Iron Bridge Company have lately shipped to Mexico two large buildings for the same company.

Construction of Gold's Electric Car Heater.

The illustration herewith, Fig. 1, shows a portion of the resistance coil and the manner of winding used in the Gold car heater made by the Gold Street Car Heating Company, of New York.

The winding of the resistance is on an open pitch, so that when it is placed on the rod the wire is in its natural position In the construction of the Gold improved heater the resistance coils are supported in such a way that the support itself, while holding the wire firmly in place, can not vibrate.

FIG. 1.—METHOD OF WINDING RESISTANCE COIL AND SUPPORT OF GOLD CAR HEATER.

The new method is shown in Fig. 1, and, as can be seen from the illustration, differs from other designs. This support consists of a one-quarter inch steel rod, which is thoroughly covered with an insulating enamel and which enamel is burned on the rod at a temperature of over 2,000 degrees. It is, therefore, not affected by any heat to which it will be subjected, and at the same time is an excellent non-conductor. This rod is shaped in a zigzag form, and the resistance coil, when slipped on in place, assumes the position shown in Fig. 1. Special attention has been given to the composition of the resistance wire used in these coils, and there has been combined a high resistance with absolute non-corrosive qualities. It has been tried under all sorts of conditions, and the company states that this wire has never been known to fail.

Fig. 2 shows the interior of this heater. It is lined with asbestos, and has an air space provided at the top as shown.

This heater has the coils so arranged that the upper sets are in multiple and the lower set in single series. Six of these heaters were usually applied to a car of about 24-foot body, and graduate the heat into three different degrees by turning the handle of the switch to any of the three points noted on the dial.

An especially constructed switch, with which the first or lowest degree, the second or medium degree, or the third and hottest degree may be had by turning the handle of the switch to points 1, 2, or 3, noted on the dial, for such degree of heat as may be desired, is used.

PERSONAL.

Mr. E. J. Fenlon, of the National Conduit and Cable Company, New York, left for Elmira, N. Y., this week to attend the annual meeting of the Fire and Police Telegraph Superintendents, to be held August 9 and 10.

Mr. Martin J. Insull has withdrawn from the firm of Sargent & Lundy and has opened an office at 1013 Monadnock Block, Chicago, as manufacturers' agent. Mr. Insull, who is a brother of Mr. Samuel Insull, will continue to handle electrical appliances of all kinds.

Mr. Edward Wessels has just purchased the *Sunbeams Magazine*. This publication has been in existence for seven years, and enjoys excellent advertising patronage as well as a large subscription list. Mr. Wessels will merge *Sunbeams* into *The Universe*, his present publication, and the offices will be at 150 Fifth avenue, New York city.

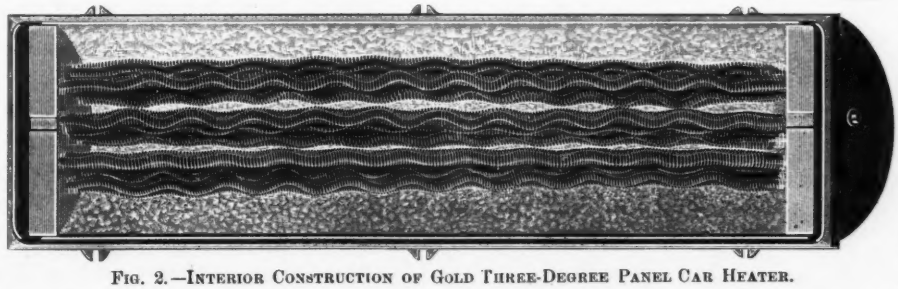

FIG. 2.—INTERIOR CONSTRUCTION OF GOLD THREE-DEGREE PANEL CAR HEATER.

The Binghamton Railway Company, of Binghamton, N. Y., have recently circulated a very handsome, illustrated little volume showing the attractive features of the city of Binghamton and suburbs. The booklet also contains excellent engravings of the buildings and equipments of the road, which is one of the most perfect electric systems possessed by a city of the size of Binghamton.

The Edison Electric Illuminating Company is the sole bidder this year for the contract for electric lighting in the borough of Brooklyn. The consolidation of the Edison and Kings County companies a few weeks ago and the purchase of the Municipal Company, ended all competition.

Electricity the Feature of the Coming Mechanics' Fair.

The spirit of progress which has characterized the executive committee having in charge the twentieth triennial exhibition of the time-honored Massachusetts Charitable Mechanic Association, is again strikingly apparent in several important directions. Not only have the character and scope of the exhibits themselves been elevated and broadened, but the building, with its immense floor area and exhibition resources, has been remodeled and greatly improved.

The main entrance is now wide and lofty, through a series of arches. The foyer is wainscoted in oak, with massive oak doors, heavily brass mounted and with French plate panels. Embossed steel ceilings, frescoed in artistic tints, still further enhance the attractiveness of the foyer, and prepare the visitor for the widened main corridor and for the handsome suite of executive offices opening directly therefrom, the walls graced by the portraits of past presidents of the association and precious mementoes and souvenirs of New England art and artisans.

Talbot Hall, in its new dress, will scarcely be recognized, for here a complete transformation has been wrought by embossed steel panels and artistic frescoes, while countless clusters of incandescent lamps have been added to the lighting equipment of the entire building.

The exterior improvements are also very marked. Lawns newly graded and bordered by green hedges suggest dainty bits of landscape gardening, while the graceful, clinging masses of Boston ivy accentuate the artistic outlines of this grand building. Latest reports from the several departments point conclusively to the most interesting exhibition in the history of the association, rendered doubly so by the timely and up-to-date competitive exhibits covering the most recent scientific and utilitarian discoveries and developments, and presenting to the world, for the first time in history, a great fair entirely driven by electricity as a motive power.

Applications for space continue and the managers find themselves confronted by the necessity of selecting only those of the greatest public interest.

SCIENCE ABSTRACTS.

The following extracts of interest to our scientific readers are from the official publication of the Institution of Electrical Engineers, London, edited by Mr. J. Swinburne:

Coherers. C. Rovelli—The author uses a coherer made up of iron filings, with two thin wire contacts. It is only found necessary to touch the wires or even to blow upon them, in order to restore the needle to its position; it is not necessary to shade the iron filings. The inference is that the change in the filings is confined to the immediate neighborhood of the wires; and the author thinks the action of the electric wave produces an increase in the difference of potential at the ends of the wires immersed in the iron filings. The necessity for this latter conclusion is questioned by R. Malagoli.

Roentgen Rays. A. Volta—This is a note on Prof. Filippo Re's pamphlet ("La teoria dei raggi Roentgen," Palermo, Reber, 1898), in which, after discussing the various theories of the nature of Roentgen radiation, Professor Re arrives at the conclusion that the Roentgen rays consist of electric waves of infinite wave-length, or practically so. This explains the great diffusivity, the absence of interference phenomena, the luminescence, the passage round obstacles, the manner of reflection, the absence of refraction, the photographic action. The theory admits the possibility of polarization, but is weak in regard to the differences between different Roentgen radiations in respect of their penetrative powers.

Elastic Co-efficient of Platinum. A Winklemann—The elastic co-efficient is measured by observing the deflection of a loaded bar. The object of the work is not so much the exact determination of the co-efficient as its variation with time and changes of temperature. Repeated heatings to 400 degrees centigrade increase the value of the co-efficient at 20 degrees centigrade; with efflux of time, the bar remaining at 20 degrees, the co-efficient diminishes. In the experiments recorded the original value at 20 degrees was 16,926; after many heatings to 400 degrees its value was 18,380; at the end of about 10 months' rest the value was 17,516; after an additional rest of about three and one-half months (13½ months in all) the value was 17,508. Whether the co-efficient would have attained its original value if left undisturbed for a longer period is not known.

Koepsel's Instrument for Measuring Magnetic Induction. H. Kath—This is an improved form, brought out by Siemens & Halske, of Koepsel's instrument for the direct reading of magnetic induction in test bars. It may be described as a D'Arsonval galvanometer used inversely; i. e., instead of measuring the current in a movable coil suspended in a field of constant strength, it measures the field when a constant and known current is sent through the movable coil. It consists of a heavy soft iron semi-circular yoke, with a magnetizing coil, without iron core, along its diameter. The test rods, 6×24 millimetres, are inserted in the axis of the coil through holes in the yoke. In the center of the yoke is pivoted a coil with pointer similar to that of the Weston instruments. The magnetizing effect of the fixed coil when without the test core is compensated for by two windings on the yoke in series with the coil and acting in opposition. Auxiliary apparatus is provided as follows: A circular resistance box for giving the magnetizing current suitable values for taking a cycle; another resistance box with three dials for fine adjustment for regulating the current through the movable coil to the value required for direct reading; namely, the constant of the instrument divided by the section of the test rod in square centimetres; a special plug switchboard in connection with a Siemens & Halske milliammeter, which latter measures the movable coil current directly, and the magnetizing current when shunted. A deflection of one degree on the shunted ammeter, corresponding to 0.01 ampere, gives unit magnetizing force.

Irreversible Wave Motions. L. Boltzmann—Planck, in his papers on irreversible wave motions, conceives a space bounded by an absolute reflecting surface. A system of electromagnetic waves is set up in this space according to Maxwell's equations, it being assumed that there is no dissipation of energy. If there be introduced into the space small resonators, Planck maintains that the wave system will be altered in an irreversible manner, and that without dissipation of energy. Boltzmann asserted that if at any instant the magnetic polarizations were reversed, the electric forces and polarizations remaining unchanged, the system of waves must retrace its course, and is in that sense reversible. Planck replied that this reversed motion is inconsistent with his assumed fundamental condition; namely, that the primary wave in the neighborhood of any resonator is to possess at all times finite and continuous values. Granted, then, that the reversed motion would take place, it does not, he says, contradict his theory. Further, Planck asserted that there is no other case in nature in which irreversible processes take place without dissipation of energy. In the present paper Boltzmann asserts:

1. The surface of a resonator may be regarded as part of the bounding absolutely reflecting surface, and can no more give rise to an irreversible process than the bounding surface itself can.

2. If resonators render irreversible processes possible, then Poincaré's view must be wrong, that irreversible processes can not be deduced theoretically from the differential equations of pure dynamics.

3. In the theory of gases there exists a state, or distribution of momenta, more probable than any other (the state in which H is minimum), and a system generally tends to pass into that state; but the reverse motion, in which it would pass out of the state, is mathematically possible, though highly improbable. So in a system of waves, there may exist a state more probable than any other. And, precisely as in the theory of gases, the system tends to pass into that state, but the reverse motion is mathematically possible, though highly improbable. The most probable state is called by Boltzmann "ungeordnet." The states to which we should apply the term ungeordnet are infinite in number compared with the states to which we should apply the term geordnet. The chance, therefore, that the system being now geordnet shall become after time t ungeordnet is infinitely greater than the chance that being now ungeordnet it shall after time t geordnet, although the course by which it passes from a particular geordnet state x to a particular ungeordnet state y may be described in the reverse way from y to x. In that sense the process is irreversible.

The American Street Railway Association.

TO THE EDITOR OF ELECTRICAL REVIEW:

I desire to remind all our members that the next meeting of this association will be held at Mechanics' Association Hall, Huntington avenue, Boston, Mass., September 6, 7, 8 and 9, 1898. We expect to have the largest convention we have ever held. Papers will be read on live subjects. The exhibits will be a prominent feature of the meeting. Full particulars in regard to hotels, railroad rates, etc., were given you in circular of May 1. In order to secure reduced fare you must get a certificate from the agent when you purchase your railroad ticket. Headquarters at Hotel Brunswick. Please fill out and mail at your earliest convenience the enclosed card. Hoping to have your company represented, I remain,

Yours very truly,
T. C. PENINGTON,
Secretary and Treasurer

Chicago, August 1.

ELECTRIC RAILWAY NOTES.

The Anderson, Ind., Street Railway has been sold to the Union Traction Company, better known as the Gas Belt Electric Railway. The consideration was $150,000 cash and $150,000 in notes.

At the annual meeting of the stockholders of the Cortland & Homer, N. Y., Traction Company directors were elected as follows: Messrs. C. D. Simpson, H. P. Simpson, P. S. Page, H. Bergholtz, Hugh Duffey, B. F. Taylor, Edwin Duffey, M. L. Perrin, F. P. Mooney.

It is reported that the Second Avenue Traction Company, of Pittsburgh, Pa., is considering the project of extending its line from Calhoun Park to Homestead, Duquesne and McKeesport to compete with the Homestead & Highlands and the Monongahela lines, now undergoing changes.

The entire route of the Monongahela, Pa., Traction Company is to be paved and new tracks laid at once. The new tracks will cost nearly $100,000. Arrangements have been completed with the Consolidated Traction Company by which the Monongahela company will come into Pittsburgh over the Fifth avenue tracks.

The West End Traction Company, of Pittsburgh, Pa., has just completed its new power plant at the point. Two 1,000-horse-power Green compound condensing engines, with two 1,000-horse-power Westinghouse generators, have been put into operation, and are working very satisfactorily. Among the other improvements the company is making is the extension of its line on Mt. Washington, and running the Carnegie branch to Bridgeville. Arrangements are also being made to connect the Coraopolis line with the McKees Rocks line at Island avenue. A number of improvements are contemplated.

At the annual meeting of stockholders of the New York & Queens County Railway Company the following directors were elected for the ensuing year: W. H. Shelmerdine, E. J. Matthews and James M. Gregg, Philadelphia, Pa.; C. A. Simpson, Scranton, Pa.; J. R. Beetem, Flushing, N. Y.; E. L. Bushe, New York city; Frank P. Maize and George H. McDonnell, Long Island City; Joseph L. Magnolia, New York city. At the organization of the board of directors the following officers were elected for the ensuing year: W. H. Shelmerdine, president; J. R. Beetem, vice-president and general manager; I. M. Tirtt, secretary and treasurer.

TELEPHONE NEWS AND COMMENT.

The telephone question in Washington, D. C., is becoming quite acute.

The Bell telephone interests are much elated over the decision in favor of the Carty bridging-bell patent.

Mayor Warwick, of Philadelphia, has signed the Drawbaugh telephone bill. The managers of the new company announce that they expect to give service in one year from date.

The Colorado Telephone Company's exchange, in Colorado Springs, has been removed to the new $15,000 telephone building. This move was made without interference with the service.

The Harrison Telephone Company's system in Toledo, Ohio, has been sold. There were 800 subscribers. The new board of directors are L. C. Cole, J. R. Hankey, A. Froney, R. S. Patty, of Bowling Green, and R. E. Connelly, of Toledo. L. C. Cole was elected president; R. E. Connelly, formerly connected with the company under the Cook régime, was appointed financial secretary. The members of the company say that they intend to push the enterprise and put in a first-class plant.

The State Board of Taxation has disposed of the appeals of the New York & New Jersey Telephone Company's assessment of taxes for 1897 by the cities of Orange and Elizabeth. The Orange assessors made the valuation $100,000, and the company wanted it reduced to $35,000. After hearing both sides the board made the valuation $47,732.28. In the Elizabeth case the local assessors made the valuation $43,000. The company asked to have it reduced to $30,000. A compromise was effected and the valuation fixed at $40,000, which was confirmed by the board.

A mortgage of $150,000 has been placed on record at Chattanooga by the East Tennessee Telephone Company to the Nashville Trust Company. The money realized by the mortgage is to be used in paying debts and expanding the system of line now being constructed up the Cincinnati Southern road, with Harriman as its destination, and another is in process of construction from Bristol to Morristown. Several pay stations are being put in Chickamauga Park for the convenience of the army officials As a result of the army encampment the business of the telephone company has been very materially increased.

A new telephone company, said to be the Stromberg-Carlson company, is seeking an opening in Joliet, Ill The Council last year granted a franchise covering the city to Col. John Lambert. He in turn sold it to a Chicago company for $10,000 and turned the money over to the city for a New Year's present. It was supposed this franchise would shut out all competition, but representatives of another company, with Chicago capital, are now on the ground preparing to put in a plant and furnish telephones at greatly reduced rates. The proposition has been kept secret, but is expected to come before the Council soon.

Two suits were begun in the Common Pleas Court by the city of Philadelphia against the Philadelphia Standard Telephone and Telegraph Company, as principal, and the Chestnut Street Trust and Saving Fund Company, as surety, to recover damages for the failure of the telephone company to put in operation within one year from the date of the approval of its plans, July 23, 1896, a system to accommodate 2,000 telephones in the city of Brotherly Love, and also for failing to construct, lay and maintain a system of cables, wires and electric conductors. The suits are brought on two bonds given by the telephone company, conditioned for the payment of $50,000 each, with the trust company as surety, for the faithful performance of the contract entered into with the city.

"The Detroit Telephone Advertising Company" is the name of a firm that is getting up a new thing in the line of telephone books. The production may lead to litigation between the firm and the telephone companies. Both the Detroit and Michigan Bell companies have copyrighted their telephone books and have refused on any consideration to let them be used for advertising. The new book is a combination of all the telephone numbers of both companies in the city, so arranged that at a glance may be told what 'phone the subscriber has and what number. The numbers are to be printed on heavy cardboard and fixed to a frame, which is to be fastened to the wall beside the telephone. We predict that it will be found that the telephone companies are right in their stand, and correct lists can only be secured through them.

Testing of Steel Armor-Plate by Induction.

It is unnecessary to state in how many cases the principle of induction has been used, but it is certainly of importance and immediate consequence to point how a new application may be made of it, says the *Digest of Physical Tests*. The great fighting battle-ships of this country depend for their efficiency upon the thick belt of armor surrounding them and reaching three feet below the water-line. It is a great satisfaction to know that this armor is free from blow-holes, homogeneous and capable of withstanding the tremendous shocks of projectiles hurled at it with the force of thousands of foot-tons per second.

A suggestion contained within this article is simply to the effect that steel armor could be tested by an induction method, which would certainly lead to the conclusion as to its availability for naval purposes.

In an article published by Prof. D. E. Hughes in the proceedings of the Physical Society of London, Vol. III, page 1, called "The Induction Balance and Experimental Researches Therewith," a method is outlined which, if applied to metals of any given thickness, will afford a means of scientific comparison which is by nature so accurate as to rise above criticism, test, or inspection of any other description. The Hughes induction balance has been utilized on a small scale for the purpose of testing counterfeit coin, but it will find its immediate use in detecting pieces of defective armor plate in the same manner. Blow-holes in the metal and differences in the proportions of metals used in any samples tested will be immediately detected.

The simplicity of the method and the ready means of discrimination offered should lead to its immediate adoption by the naval department of the United States in examining each piece of armor-plate before it is placed into position upon the vessel's hull.

In the present war success will depend as much upon the effectiveness of the armor employed as upon the penetrating power of the projectiles, and it would seem as if a vessel properly armored, having smaller guns than its opponents, would do greater damage than if its guns were larger and its armor weaker. If the United States desires to realize its hankering wish to become the greatest naval power in the world, it will have to pay special attention to the qualities of its armor, the strength of a battleship lying more in this than anything else that can be considered.

The testing of armor-plate by means of a gigantic induction balance would put a quietus on all doubts as to the invincibility of the armor manufactured, within the limits of the specifications, and would add to the confidence of those intrusted with the care of one of our floating forts.

The Searchlight in Naval Warfare.

Included in Admiral Sampson's report of the operations of his fleet in destroying Cervera's squadron at Santiago are a number of orders and memoranda issued by him during the Santiago blockade. The following shows the important part played by the searchlights of the fleet while on blockade duty:

U. S. FLAGSHIP "NEW YORK," FIRST RATE, OFF SANTIAGO DE CUBA, CUBA, June 8, 1898.

During the dark hours of the night searchlights will be used as follows:

The "Iowa," "Oregon" and the "Massachusetts" will take turns of two hours each; i. e., from dark to 8 P. M., and from 8 P. M. to 10 P. M., etc., in keeping one searchlight directly on the harbor entrance, maintaining carefully during that time their blockading positions. Should a vessel's lights fail the next in order will at once take up the duty.

The picket launch and vidette, stationed south of the Morro, will move to one side or the other sufficiently to get clear of the beam of light.

The vessels on each flank, the "Brooklyn" and the "Texas" on the western side, the "New York" and "New Orleans" on the eastern side, will take two-hour turns in using one searchlight from time to time on the coast line, swinging it towards the Morro, but avoiding the illumination of the flanking videttes on the inside line. The light should never be turned off more than five minutes at a time. From time to time the horizon outside will be swept.

Attention is called to bad and careless handling of searchlights. Last night some of the lights were kept high in the air and were again swept rapidly from side to side. Under such circumstances a searchlight is worse than useless.

The beams must be directed to the horizon, and must be moved very steadily and slowly. Not less than three minutes should be employed in sweeping through an arc of 90 degrees.

The best way to discover a torpedo boat is by its smoke, and even this will not be seen unless the light is very well handled. Very respectfully,

W. T. SAMPSON,
Rear Admiral U. S. Navy, Commander-in-Chief U. S. Naval Force, North Atlantic Station.

On July 1 the Erie Telephone and Telegraph Company had 23,693 subscribers in its territory.

ADVANCE INFORMATION

New Incorporations.

INDIANAPOLIS, IND.—The Indianapolis Storage Battery Company, with a capital of $100,000, to manufacture storage batteries and electrical machinery, has been incorporated. The incorporators are Charles F. Smith, Loren S. Dow and Anthony J. Wilson. The company is organized for the manufacture of horseless carriages.

VINELAND, N. J.—American Electrocure Company, to manufacture and sell electrical appliances for curative purposes, has been incorporated; capital stock, $100,000. Incorporators, Benjamin F. Ladd, Eli B. Hendee, George Davidson and others, all of this place.

BALTIMORE, MD.—Electric Gaslight Company has been incorporated, to manufacture and sell machines for the generation of acetylene gas; capital stock, $10,000.

New Electric Railways.

ERIE, N. Y.—There is a project on foot to build an electric road from this place to North East, a distance of 14 miles, the money for the enterprise to be supplied by Erie capitalists.

ROCHESTER, N. Y.—The surveyors for the proposed Rochester-Sodus Point electric railway have finished their work. The road will pass through Wallington, connecting with the Northern Central.

ANDERSON, IND.—Anderson and eastern capitalists have taken up the construction of an electric railway connecting Eaton, Middletown, Winchester, West Eckton and Jacksonboro and other Ohio towns. The survey is being made, and the material is being contracted. The line will be 22 miles in length. S. C. Parkhurst, of the Chicago & Southeastern, is the promoter and is interested. Hon. J. W. Lovett and other Anderson capitalists are constructing an electric railway from LaPorte, Ind., to Michigan City.

MONTICELLO, IND. — Tippecanoe Electric Railway Company has been incorporated by Charles C. Spencer, Emory B. Sellers, and others; capital stock, $50,000.

LANSING, MICH.—The Michigan & Indiana Railway Company has been organized for the purpose of constructing an electric railroad connecting Niles, St. Joseph, Benton Harbor, and other southern Michigan towns.

KALAMAZOO, MICH.—The Battle Creek-Kalamazoo electric line will be built by next Spring.

CORUNNA, MICH.—A new electric railroad is being projected to run from this place to Durand.

DEXTER, N. Y.—The Black River Traction Company has decided to extend its line to this place, a distance of three miles from Brownville. Work will probably be commenced in the Fall.

Electric Light and Power.

LYONS, MICH.—The General Electric Company has contracted to put in an electric lighting plant at this place.

WABASH, IND.—The North Manchester Electric Light Company has made a proposition to the Town Council of that place to buy its plant, and the latter has the offer under consideration.

CLEAR CREEK, COLO.—The Clear Creek Power Company has been incorporated with a capitalization of $1,000,000. Boston and Ohio capital is behind the project, which contemplates the utilization of Clear Creek to generate electric power for mining purposes. Other incorporators are: F. Rockerfeller, M. A. Bradley, M. Henderson, D. R. Taylor, H. P. Malone and E. G. Tilotson, all of Cuyahoga County, Ohio. The object of the company is to acquire, hold and develop water rights and generate electric power and sell it.

CULLMAN, ALA.—Jas. E. Clark is interested in the Cullman Water and Lighting Company, which is being organized to construct waterworks and electric light plant at an estimated cost of $15,000.

BATESVILLE, ARK. — An electric light plant is to be constructed.

JACKSONVILLE, FLA.—C. O. Patterson may be addressed concerning extension of electric light system.

JACKSON, GA.—M. L. Hendrick may be addressed concerning contemplated erection of electric light plant.

FITZGERALD, GA.—Moore & McRary have been awarded contract for construction of electric light plant.

HENDERSON, KY.—The Mayor may be addressed concerning proposed construction of electric light plant.

ELLISVILLE, MISS. — An electric light plant is in contemplation.

KINGWOOD, W. VA —U. N. Orr may be addressed concerning proposed establishment of electric light plant.

SEBASTOPOL, CAL —G. W. Swain is interested in the establishment of an electric light plant.

New Telephone and Telegraph Companies.

ATLANTIC CITY, N. J.—The Atlantic Coast Telephone Company, which was recently granted permission to run its wires in this city in opposition to the Bell Telephone Company, has completed its organization by electing the following officers: President, E. L. Reinhold; treasurer, Louis Kuehnle; directors, E. L. Reinhold, James B. Reilly, H. Burdcassel, H. L. Haldeman, Louis Kuehnle. The work of construction will begin shortly.

NEW ALBANY, IND. — The Ohio Valley Telephone Company will begin shortly the erection of the new exchange building at East Fifth and Market streets. As soon as the building is completed the wires will be placed in the underground conduits recently laid on Market and East Tenth and Eleventh streets.

WINDSOR, MICH.—The City Council of London has granted a franchise to the People's Telephone Company, of this place.

DOVER, DEL.—The Diamond State Telephone Company, of this town, is considering the advisibility of extending its line to Middletown and Clayton. The present northern terminus is Smyrna. The line is being completed at Lewes this week.

FULLERTON, CAL. — A telephone exchange will be established in this town in a few days. Already 20 subscribers have been secured in town. About eight or ten subscribers have already been secured in Placentia, and the line will be extended to that point at once, and perhaps to the Santa Fé oil wells.

EASTON, MD.—The telephone line between this place and Cambridge has been completed, the two systems connecting at Federalsburgh.

WHITTIER, CAL.—A telephone exchange is now in operation here, there being about 12 subscribers.

FRANKFORT, KY.—The Boston & Elizabethtown Telephone Company has been incorporated; capital stock, $3,000.

WASHINGTON, PA.—The Washington County Telephone Company has been incorporated to operate a telephone system in Washington, Green and Allegheny counties; capital, $75,000; directors, Jas. Kuntz, Dr. A. W. Pallock, Washington; James S. Brailey, Jr., Toledo, Ohio; J. G. Ihmsen, Pittsburgh; Ed L. Barber, Wauseon, Ohio.

ABILENE, KAS.—The long-distance telephone line from Salina to Junction City is completed, and is working with stations at all intermediate towns. A branch line to Herington is in prospect.

DETROIT, MICH.—A new telephone line will be constructed in Huron County by the Thumb Telephone Company. A system will connect Bad Axe and Sand Beach, and another will be put in between Bay Port and Pigeon.

BOLIVER, MO. — J. C. Pike and H. S. Bruce will establish a telephone system here.

HAGERSTOWN, MD.—The Cumberland Valley Telephone Company's promoters held a meeting recently, and the entire amount of the capital stock $50,000 was subscribed and 10 per cent paid in.

Increase of Capital.

ST. LOUIS, MO.—The Central Traction Company has increased its capital from $100,000 to $5,000,000.

BROOKLYN, N. Y.—A certificate of an increase of the capital stock of the Nassau Railway Company, of Brooklyn, N. Y., from $6,000,000 to $15,000,000, has been filed with the Secretary of State.

COMMERCIAL NOTES.

The Western Electric Company in placing upon the market its new long-burning arc lamp used the name "Midget" in describing it owing to its size, the lamp being but 20 inches in length. The name "Midget," however, is no longer used by them in describing this lamp, but the name "W. E. Petite" has been adopted.

The Phœnix Insurance Company, of New York, is one of the successful fire insurance companies, and possesses the snug surplus above all liabilities of $1,305,105.57. The Eastern Agency Department is at 47 Cedar street, New York, where Mr. J. Q. Straeffer, the assistant general agent, is at home to countless friends.

The Long Island Railroad, under the excellent management of traffic manager H. M. Smith, is doing an immense Summer passenger business. The cool and breezy shores of Long Island have never been so popular, notwithstanding the brief war scare, and to-day nearly every boarding-house and hotel is full to overflowing. A number of special fast trains have been added to the Long Island Railroad's Summer equipment.

The Brown-Bierce Company, general engravers, at Dayton, Ohio, are certainly turning out an excellent line of work. We are in receipt of some specimens recently executed by this enterprising concern, which are certainly highly creditable in every way. This concern has built up a large business in the engraving line, strictly on the merits of product, and the ELECTRICAL REVIEW conscientiously recommends them to any one in need of work in this line. They have illustrated within the past few years a large number of the very finest catalogues produced in this country. They make a specialty of fine machine engraving. We wish them every success.

The Hayden & Derby Manufacturing Company, 111 Liberty street, New York, are distributing an artistic catalogue devoted to the "Metropolitan" injectors. In this catalogue attention is called to several new features. In the ratings of injectors the horse-power is given, not only on the basis of seven and one-half gallons of water per horse-power per hour, which has always been the standard basis of figuring the horse-power of injectors, but the horse-power on a basis of 30 pounds evaporation of water per horse-power per hour is given. Injectors are shown with flanged as well as screwed connections, and all of the various forms of injectors which they produce are shown also in dimension diagrams, which enables the piping to be laid out from the data in this catalogue. The catalogue also describes new forms of injectors, hot-water heaters and special injector fittings.

The Livingston, Mont., electric light plant has been destroyed by fire at a loss of $32,000, more than half covered by insurance.

Electrical.... Patents.

[Specially reported for this journal by E. S. Duvall, solicitor of patents, Loan and Trust Building, Washington, D. C. Copies of any patent may be secured for 10 cents each.]

ISSUED AUGUST 2, 1898.

608,175 Reciprocating electric drill; Herman Cusler, Canastota, N. Y.—In a reciprocating drill, the combination with energizing coils and a magnetic core within the same, of a casing for the coils composed of an exterior shell, heads or ends, and an interior lining tube all of iron or steel, and united by water-tight joints.

608,178 Electric rail-bond and method of securing same in place; Wm. R. Cock, Plainfield, N. J.—The method of securing a hollow, preferably slightly conical, electric bond-terminal in place in a rail, which consists in first forcing the terminal into a perforation in the rail and then expanding it and clenching it against the edge of the perforation in the rail by progressively expanding the hollow bond-terminal by means contracting and acting at one time only on a narrow annular section of the bond-terminal but successively on all portions of the bond to be expanded.

608,211 System for heating by electricity; James F. McElroy, Albany, N. Y., assignor to the Consolidated Car Heating Company, same place.

608,212 Car heating system; James F. McElroy, Albany, N. Y., assignor to the Consolidated Car Heating Company, same place.

608,216 Battery zinc; Dora Ogden, Columbus, Ind.—The combination of a battery cell having a cover provided with an opening there through for the introduction of one of the electrodes, two or more electrodes with stems, a plug mounted in the cover and having an opening receiving the two or more stems, and means for securing said stems within said opening, whereby the said electrodes may be suspended in the cell.

608,228 Galvanic bath; Carl E. Schonee, Carlsbad, Austria-Hungary.—A galvanic bathing apparatus composed of upper and lower tubs, insulating bases for supporting the same, a pair of electrodes projecting into each of the tubs, wires connecting the upper tubs and leading to the negative pole, and wires connecting the lower tubs and leading to the positive pole of a source of electric energy.

The Progressive Pennsylvania Railroad Management to Take in the Trolley Lines.

It is stated on good authority that leading interests in the Pennsylvania Railroad Company have become large stockholders in a number of the trolley companies which have in recent years been built up and extended in cities and towns through which the Pennsylvania runs. The business of the trolley lines is admitted to be eating into the business of the steam roads, and the buying into these trolley companies by Pennsylvania interests is thought to be preliminary to a possible control of the trolley lines for the sake of the steam roads.

At any rate Pennsylvania interests could in this way control the policy of the trolley lines with respect to the freight business anyhow. The question of hauling freight is much more disturbing to railroad people than hauling passenger business. It is said that some of the companies have been contemplating the inaugurating of a freight delivery in competition with the steam roads. The trolley lines could run their freight cars at night to advantage, and, knowing this, it is thought the steam companies will try to prevent it.

NOTICE.

This is to notify the trade that one N. S. Parker, traveling through the west, representing himself as a representative of the Fort Wayne Lamp Company, manufacturers of incandescent lamps, Cleveland, Ohio, is not a represen ative of this company. The trade is warned against him.

L. H. ROGERS.

Site suitable for Power-House or similar use to lease for long term of years. Ground 84x84, within one block of BROADWAY, NEW YORK. Fronting on three streets, more ground adjoining could be acquired. Is high and dry, permitting basement thirty feet deep. Basement could also run under sidewalks of all three fronts. Apply to

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has a locking device, making it impossible to open until full tension of spring is obtained; this prevents dragging and insures an absolutely instantaneous break. All parts interchangeable. Every switch guaranteed free from defects of work or material. Ask for photograph and prices.

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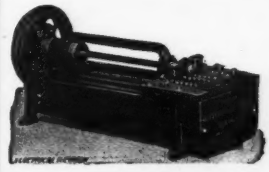
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Kindred.... ...Interests

The Central Electric Company, of Chicago, is issuing a very attractive circular on various types of electrically-heated cooking utensils and appliances, and will be pleased to send the same to any one on application.

The Fall River Bleachery, at Fall River, Mass., have placed the contract for their new mill with the Berlin Iron Bridge Company, of East Berlin, Ct. The building is 65 feet wide and 200 feet long, with side walls of stone, the supporting framework being made of steel.

Pass & Seymour, Syracuse, N. Y., the well known manufacturers of porcelain electrical specialties, are sending out a neat little folder advising the trade that they have been in the business over eight years, that the quality of their product still leads, and that their catalogue will be sent on application.

The Cling-Surface Manufacturing Company, 10 Court street, Buffalo, N. Y., manufacturers of "Cling-Surface," a well known belt preparation, report a brisk trade and that they are behind in their orders. A lately received order was for three barrels of "Cling-Surface" from the Delamar Gold Mining Company, of Delamar, Nev. Applications for agencies have been received from London, Germany and Sweden.

The K. & W. Company, Pittsfield, Mass., are announcing bargains in a number of alternating-current fan motors. They state as follows: "We have a limited number of these motors, which we purchased from a manufacturing company that has discontinued the manufacturing of fan motors, which we can offer at prices named. The motors are new, handsomely finished and in first-class condition, and a great bargain. They are for currents of 50 to 55 volts, 16,000 alternations only."

The Electric Appliance Company, Chicago, are very proud of the fact that they will soon complete the seventh year of their electrical supply business. The Electric Appliance Company claim, and, it is believed, justly, that after confining themselves strictly to the electrical supply business, as they have for this period of time, they should be in the best possible position to handle that branch of the electrical business successfully. It is very apparent, from the volume of business they are now doing and their position in the electrical field, that their business has been thus far very successfully handled.

Resistance wires for all uses are imported by Herman Boker & Company, 101–103 Duane street, New York. A wire which is said to have three times the resistance of German silver, and known as "Boker's superior wire," designed especially for furnishing resistance in arc lamps, rheostats and apparatus of that character. "Boker's 1ª–1ª wire," giving increase of resistance for each centigrade .000005, 1⅔ times the resistance of German silver, is imported from the Westfaelian Nickel Rolling Mill, Schwerte, Germany, in wire sheets and nickel. From Messrs. Eicken & Company, Hagen, Germany, they import a steel music wire which has gained world-wide popularity for quality, uniformity of temper and accuracy of size. Also from Messrs. Jonas & Colver, Herman Boker & Company import a special magnet steel which is said to fulfill requirements never before met, for the reason that the steel is of exceptional quality, carrying an astonishing weight and retains magnetism to a high degree, thus making it very desirable for permanent magnets.

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The recent decision in Pittsburg against the Bridging Telephones made by the Western Telephone Construction Company, of Chicago, has no bearing on the American Electric Telephone Company's Bridging Telephones; in fact, it leaves the American telephones about the only non-infringing multiple system in existence.
Moral: Do not rush into trouble. Buy American apparatus.
Chicago, Aug. 1.
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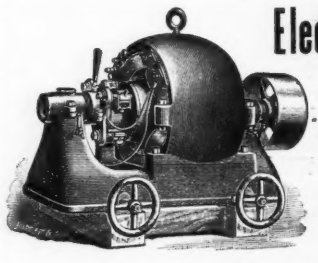
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saves time and trouble, insures privacy, adds to the convenience and flexibility of the telephone service. The rate for an Extension Station, to Message Rate Subscribers, is now $1.00 a month, with installation charge.

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